MSC ASSESSMENT REPORT THE UNITED STATES GULF OF ALASKA POLLOCK FISHERY

Final Report

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Client:
At-Sea Processors Association

Accredited Certification Body:
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608, United States

Assessment Team
Dr. Chet Chaffee, Project Manager, SCS
Dr. Tony Smith, CSIRO, Hobart, Tasmania, Australia
Dr. Robert Furness, University of Glasgow, Scotland
Thomas C. Jensen, Esq., Sonnenschein Nath & Rosenthal LLP

Amendments Issued Since Original Draft

Amd. No	Date	Description Of Amendment
1	November 2003	Draft Report for Public Comment
2	November 5, 2003	Draft for Peer Review modified from public review draft by adding scores and weights to the MSC Principles, MSC Criteria, subcriteria, and indicators.
3	July 02, 2004	Final Report after peer review and public comment
4	28 April 2005	Final Report GOA Pollock Fishery after MSC Objections Procedures completed

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1 INTRODUCTION

The Marine Stewardship Council (MSC) is a non-profit organization dedicated to the long-term protection or "sustainability" of marine fisheries and related habitats. First started as a joint initiative between Unilever and the World Wildlife Fund (WWF), the MSC is now a fully independent organization that is governed by an independent Board of Directors advised by a panel of scientific, economic, and fishery experts.

The MSC's original mission statement promoted responsible, environmentally appropriate, socially beneficial, and economically viable fisheries practices, as well as the maintenance of biodiversity, productivity and ecological processes of the marine environment. The current MSC mission statement (redrafted in 2001) provides a slightly more focused mission and reads,

"To safeguard the world's seafood supply by promoting the best environmental choice".

Dedicated to promoting "well-managed" fisheries, the MSC initiative intends to identify such fisheries through means of independent third-party assessments that are carried out publicly. In accordance with the MSC's requirement for public transparency, fisheries can be awarded a certification if the fishery receives a passing score during the evaluation process, a peer review finds the evaluation to be acceptable, and there are no significant disputes by stakeholders over the findings of the certification body. Should formal disputes be lodged against the certification body's findings, an independent process is engaged to review the dispute in order to ensure that stakeholder concerns are fully understood and considered, and that all MSC procedural and substantive rules have been observed prior to certification (see MSC Objections Procedures at www.msc.org). If certified, a fishery is given the opportunity to utilize an MSC promoted eco-label to gain economic advantages in the marketplace. Through certification and eco-labeling, the MSC's intent is to promote and encourage better management of world fisheries.

The Marine Stewardship Council developed standards for sustainable fisheries management in a three-step process (May, Leadbitter, Sutton, and Weber, 2003): 1) Assemble a group of experts in Bagshot (UK) to draft an initial set of Principles and Criteria; 2) Conduct an 18-month process to review the standard in 8 major international venues; and 3) Convene a second set of experts in Warrenton, Virginia (Airlie Conference Center, USA) to revise and finalize the MSC Principles and Criteria.

The final MSC standard (see below) was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program to qualify as certifiable and able to utilize the MSC eco-label.

This report documents the procedures, data, and information of the assessment of the Gulf of Alaska pollock fishery.

1.1 The Fishery Proposed for Assessment

The fishery evaluated in this report is:

Species:	*Theragra chalcogramma*
Geographic Area:	Gulf of Alaska
Fishing Method:	Pelagic Trawl
Fishery Management:	North Pacific Fishery Management Council, National Marine Fisheries Service.

1.2 Key Issues for the Assessment

There were several areas of note that had to be dealt with in this assessment and are discussed in greater detail in Section 7, Evaluation Team Performance Evaluation:

1. Stock Status (see Section 7, MSC Principle 1):

In the Gulf of Alaska, the status of the pollock stock is a significant consideration within the assessment. Currently, the stock is just above the biomass limits where zero fishing requirements are designated to be implemented by the control rules in place in the fishery. There is significant enough concern about the status of the GOA pollock stock that NMFS recommended a Total Allowable Catch (TAC) that is less than in previous years both in terms of absolute biomass and as a percentage of the ABC (Allowable Biological Catch). Moreover, NMFS has contracted with the Center of Independent Experts to review the fishery because of ongoing concerns.

2. Threatened and Endangered Species in the area of the fishery (see Section 7, MSC Principle 1, MSC Principle 2, and MSC Principle 3):

In the Gulf of Alaska (just as in the Bering Sea) the threatened and endangered species, *Eumetopias jubatus*, or Steller sea lion is found in the area of the fishery. Since its original listing in 1990, the protection of the species is required under the United States Endangered Species Act. Also important is the fact that some Steller sea lion populations in the area of the GOA fishery are still on a decline. Careful consideration was given to the vast amount of information associated with the interactions between Steller sea lions and the pollock fishery.

3. Compliance with national regulations for federally managed fisheries in the United States (see Section 7, MSC Principle 3):

The pollock fishery in the Gulf of Alaska is part of a complex of fisheries that together are among the largest fisheries in the United States and part of a group of groundfish fisheries that receive both intense management and intense public scrutiny because of their potential to have large scale ecological and socioeconomic effects. The intense public scrutiny has often led to disagreements among stakeholders in the fishery and with the management system (particularly the North Pacific Fishery Management Council and the National Marine Fisheries Service). One of the outgrowths of these disagreements has been that conservation groups acting on behalf of the public trust have filed a number of lawsuits alleging that the fisheries management agencies are not properly meeting the requirements of the laws that regulate fishery management in the United States. As part of this assessment, the issues of ongoing legal compliance and its relevance to the certification of the pollock fishery were intensely examined by scientists and attorneys on the evaluation team and within stakeholder groups.

2 THE UNITED STATES GULF OF ALASKA POLLOCK FISHERY

A brief description of the Gulf of Alaska pollock fishery assessed in this project is provided in the following subsections. The descriptions are general in nature and brief, since a good deal of this information is more fully discussed in Section 7, Assessment Team Performance Evaluations.

2.1 The Target Species

Walleye pollock (*Theragra chalcogramma*) is a key species in the Alaska groundfish complex and a target species for the Gulf of Alaska fishery.

Figure 1. Walleye Pollock - *Theragra chalcogramma*

Walleye pollock (Figure 1) are schooling, midwater to bottom-dwelling fish. Pollock live anywhere between shallow, nearshore waters to 1000 m., but most are found between 100 to 300 m depth. According to the National Marine Fisheries Service (NMFS):

"Pollock begin to recruit to the GOA fishery at age 2 and many survive 10 years or more. Seasonal migrations occur from overwintering areas along the outer shelf to shallow waters (90-140 m) to spawn. Females reach 50% maturity at 30-34 cm (3- 4 years old) and produce about 140,000 - 300,000 pelagic eggs at this size. Spawning occurs in late winter/early spring in major spawning concentrations of pollock, which have been observed in Shelikof Strait and the Shumagin Islands. Annual natural mortality of adults has been estimated to be about 25% per year (M = 0.30). Pollock feed on copepods, euphausiids, and fish (primarily capelin), and are in turn prey for other fish, marine mammals, and seabirds."

Spawning in GOA pollock is variable. According to NMFS, "the most important spawning location for walleye pollock in the Gulf of Alaska is Shelikof Strait, a deep (> 250 m) and narrow channel located between Kodiak Island and the Alaska Peninsula (Dunn and Matarese 1987, Kim 1989, Bailey et al. 1997). Spawning in Shelikof Strait is concentrated near Cape Kekurnoi at depths of 150-250 m in early April, and the area of spawning varies little over the season, which lasts until late May (Kim 1989, Kendall and Picquelle 1990, Kendall and Nakatani 1992, Kendall et al. 1996).No concentrations of spawning walleye pollock similar to the magnitude of that seen in Shelikof Strait have been observed elsewhere in the Gulf of Alaska, although Lloyd and Davis (1989) identified several additional walleye pollock spawning locations in the Gulf of Alaska, including near Middleton Island, east of Kodiak Island, near the Shumagin Islands, and along the Alaska Peninsula.Kendall and Picquelle (1990) saw evidence of some walleye pollock spawning south of Chirikof Island. Brown and Bailey (1992) analyzed hatch date distributions of walleye pollock juveniles in the western Gulf of Alaska, as determined by daily increments deposited on otoliths, and found evidence of several minor spawning populations of walleye pollock located near Unimak Pass and around Kodiak Island."

2.2 Gulf of Alaska Pollock

2.2.1 GOA Pollock Stock

According to Dorn et al. (2002), "Pollock in the Gulf of Alaska are managed as a single stock independently of pollock in the Bering Sea and Aleutian Islands. The separation of pollock in Alaskan waters into eastern Bering Sea and Gulf of Alaska stocks is supported by analysis of larval drift patterns from spawning locations (Bailey et al. 1997), genetic studies of allozyme frequencies (Grant and Utter 1980), mtDNA variability (Mulligan et al. 1992), and microsatellite allele variability (Bailey et al. 1997). The results of studies of stock structure in the Gulf of Alaska are equivocal."

Dorn et al. (2002) point out that the evidence from allozyme frequency and mtDNA studies suggests that spawning populations in the northern part of the Gulf of Alaska may be genetically distinct from the Shelikof Strait spawning population and others in the Southern part of the Gulf of Alaska. However, the data are equivocal indicating lack of stability in genetic structure for these spawning populations. Interestingly, peak spawning at these areas occur at different times (e.g. Shumagin Island area peaks between February 15- March 1 while Shelikof Strait area peaks between March 15 and April 1). According to Dorn et al. (2002), it is not clear if the differences are due to genetics or environmental conditions.

2.2.2 Stock Assessment

The primary assessment conducted by NMFS is based on an age-structured model. According to NMFS, the model incorporates fishery data and fishery independent data from bottom trawl surveys and hydroacoustic surveys. To describe the stock assessment, NMFS writes, "Beginning in 1997, OFL and ABC rates wee based on tiers defined under Amendment 44. Western/Central (includes West Yakutat) pollock fall under Tier 3b of the ABC/OFL guidelines, thus the 2001 overfishing mortality rate is F35% adjusted by the ratio of current female spawner biomass to B40% (OFL = 117,750 mt). FABC cannot exceed the F40% fishing mortality rate adjusted by the ratio of current spawner biomass to F40% (0.34). BMSY and FMSY have not been estimated for the GOA stock. Pollock in Southeast Outside and East Yakutat areas fall into a Tier 5 assessment, where the overfishing mortality rate is equal to the natural mortality rate and FABC cannot exceed 75% of the natural mortality rate (M)."

With the falling biomass in the GOA, new model estimates of spawning biomass show pollock at 177,070 t, which according to NMFS is "28% of unfished spawning biomass and below *B40%* (240,000 t), thereby placing Gulf of Alaska pollock in sub-tier "b" of Tier 3." Acknowledging that precaution is warranted in estimates the closer the estimates of spawning stock are to the limit of B20%, NMFS has taken several things into consideration. NMFS notes that the biomass estimates depend strongly on the strength of the 1999 year class. Assuming that the 1999 year class is only average in abundance, a risk averse assumption, the spawning stock in 2003 would decreases to 144,490 t, or 24% of unfished spawning biomass. NMFS states that the "lower model estimates of biomass in 2003 are primarily due to the low abundance of spawning adults in the 2002 Shelikof Strait EIT survey." Using this approach, NMFS 2003 ABC recommendation for pollock in the Gulf of Alaska west of 140° W longitude is 49,590 t, a decrease of 35% from the previous year's projected ABC for 2003, and 7% lower than last year's ABC. This was considered warranted because current status is close to the *B20%* level that would require a cessation of fishing under Steller sea lion protective. For pollock in southeast Alaska (East Yakutat and Southeastern areas), the ABC recommendation is unchanged at 6,460 t.

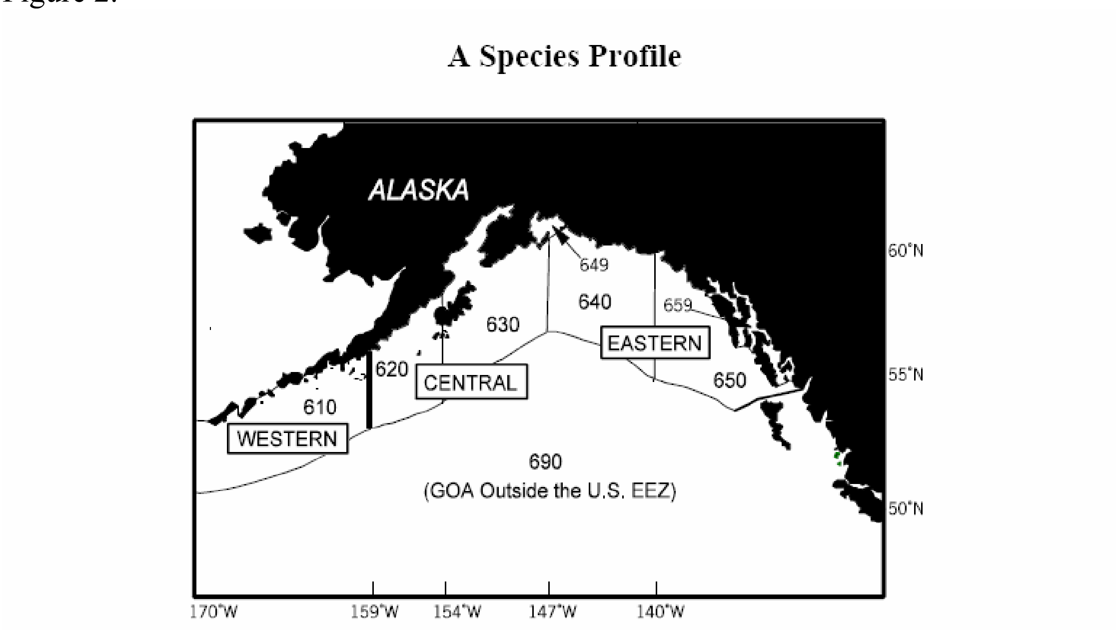
2.2.3 Fishery

The commercial fishery for walleye pollock in the Gulf of Alaska started as a foreign fishery in the early 1970s (Megrey 1989). Catches increased rapidly during the late 1970s and early 1980s. Large spawning aggregations were discovered in Shelikof Strait in 1981, and a fishery developed for which pollock roe was an important product. The domestic fishery for pollock developed rapidly in the Gulf of Alaska with only a short period of joint venture operations in the mid-1980s. The fishery was fully domestic by 1988. The fishery for pollock in the Gulf of Alaska is entirely shore-based with approximately 90% of the catch taken using pelagic trawls. During winter, fishing effort usually targeted primarily on pre-spawning aggregations in Shelikof Strait and near the Shumagin Islands (Fig. 1). Fishing areas in summer are less predictable, but typically fishing occurs on the east side of Kodiak Island and in nearshore waters along the Alaska Peninsula. Kodiak is the major port for pollock in the Gulf of Alaska, along with Sand

Point and Dutch Harbor. To protect Steller sea lions the Gulf of Alaska pollock TAC has been apportioned spatially and temporally. In 2001 Steller Sea Lion Protection Measures establish four seasons in the Central and Western GOA beginning January 20, March 10, August 25, and October 1, with 25% of the total TAC allocated to each season. In addition, the North Pacific Fishery Management Council (NPFMC) in 2002 adopted a new harvest control rule requiring a cessation of fishing when spawning biomass declines below 20% of unfished stock biomass.

Major exploitable concentrations are found primarily in the Western/Central areas (Figure 2). Pollock are targeted by trawl gear, with delivery onshore.

Figure 2.



2.3 Fisheries Management System

2.3.1 Management System

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was approved by Congress in 1976 and implemented the following year. This Act, in part, established exclusive U.S. federal authority to manage fishery resources within 3 to 200 nautical miles from the U.S. coastline and established eight federal councils around the U.S. to manage the nation's fisheries. The Secretary of Commerce was given the ultimate responsibility of overseeing the Councils' recommendations for management. The National Marine Fisheries Service (NMFS) acts as the representative of the Secretary of Commerce in the consideration of approval or denial of regulations proposed by the Councils. The NMFS receives recommendations from the councils, reviews proposed regulations and enforces fishery regulations on a day-to-day basis. NMFS fisheries managers responsible for the pollock fisheries under review are located in the Alaska Regional Office. In addition to fisheries managers, the office includes enforcement officers who work actively with the local U.S. Coast Guard in monitoring and enforcing fisheries regulations and a research division that conducts stock assessment of the EEZ fisheries with scientists in Washington and Alaska.

The current management of the pollock fishery includes a broad range of regulations designed to maintain the productivity of the stock, provide for statistically reasonable catch quotas, set time, area and gear restrictions, and place limits on harvest levels of the mature spawning stock. Other regulations are in place to minimize bycatch of target and non-target species and limit impacts on the traditional fisheries of the region (e.g., salmon, halibut, and crab). Observer programs are in place to document the target and non-target catches as well as to collect scientific data on target and non-target species.

The pollock fishery is regulated under the GOA Groundfish FMP. In 1993, the Council apportioned 100% of GOA pollock to the inshore sector. In 1998, trawl gear was prohibited east of 140° W. longitude and 100% retention was required for pollock. In 1999, as a result of the final reasonable and prudent alternatives to mitigate the adverse impacts of the pollock fishery on Steller sea lions, NMFS established four seasonal apportionments of the pollock TAC, as opposed to the previous three. A court ordered injunction on groundfish trawling within Steller sea lion critical habitat west of 144°W. longitude (in effect Aug. 8 - Nov. 30, 2000) severely limited the pollock fishery in 2000. In 2001 Steller Sea Lion Protection Measures modified the four seasons in the Central and Western GOA with season start times at Jan 20, March 10, Aug 25 and Oct 1. An equal portion (25%) of the total TAC is allocated to each season. Management measures to eliminate competition for pollock between the fishery and Steller sea lions are continuing to be developed as new information comes to light and is reviewed (see Section 7, Principle 2 for more detailed discussions).

2.3.2 Management Policies and Objectives

The policies that guide the management of the pollock fishery are derived from the Magnuson -Stevens Fisheries Conservation and Management Act of 1976, which has been amended a number of times since its passage and implementation in 1977. The basic policies of the Act that are relevant to the MSC and its principles are largely spelled out in Section 301 of the law, "National Standards for Fisheries Conservation and Management." First, the Act requires each council to develop formal fishery management plans for each fishery requiring management actions, noting "any fishery management plan prepared and any regulations promulgated to implement any such plan be consistent with the following national standards for fishery conservation and management."

1. "Conservation and management measures shall prevent overfishing while achieving on a continuing basis the optimum yield (OY) from each fishery for the United States fishing industry."
2. "Conservation and management shall be based on the best scientific information available."

3. "To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination."
4. "Conservation and management shall not differentiate between the residence of states (allocation needs subsequently discussed)."
5. "Conservation and management measures shall consider efficiency in the utilization of the fishery resources; except that no such measure shall have economic allocation as its sole purpose."
6. "Conservation and management measures shall take into account and allow for variations among, contingencies in, fisheries, fisheries resources and catches."
7. "Conservation and management measures shall, where practicable, minimize cost and avoid unnecessary duplication."
8. "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and the rebuilding overfished stocks), take into account the importance of fishery resources to fishing communities in order to (a) provide of the sustained participation of such communities and (b) to the extent practical, minimize adverse economic impacts on such communities."
9. "Conservation and management measures shall, to the extent practical, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."
10. "Conservation and management measures shall, to the extent practical, promote the safety of human life at sea."

These standards provide the basic policy guidelines within the Magnuson-Stevens Act, however; in recent years, the Act has been amended to require specific management actions to be taken consistent with the "precautionary principle."

2.3.3 Legal Framework

The formulation and implementation of all federal fishery management policies are guided by, and must comply with, the limitations and procedures stipulated in the body of federal statutes and executive orders. Currently, these include 11 statutes and 6 executive orders. Below we list the major statutes and executive orders and provide a brief explanation of each. For a more detailed explanation, see Section 7, MSC Principle 3 Introduction below.

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)

The Magnuson-Stevens Act is the principal federal statute that provides for the management of U.S. marine fisheries, originally enacted as the Fishery Conservation and Management Act in 1976 (Public Law 94-265). It has been amended periodically since 1976; most recently in 1996, by the Sustainable Fisheries Act (Public Law 104-297).

National Environmental Policy Act

The National Environmental Policy Act (NEPA) is a cornerstone environmental mandate that declares a national policy to encourage productive and enjoyable harmony between man and the environment, and to promote efforts to better understand and prevent damage to ecological systems and natural resources important to the nation. NEPA, signed into law in 1970 (42 U.S.C. 4321 *et seq.*), has two principal purposes:
1. To require federal agencies to identify and evaluate the potential environmental effects of any major proposed federal action so as to ensure that public officials make well-informed decisions
2. To promote public awareness of the potential impacts of proposed federal actions at the earliest planning stages of major federal actions and to provide for public involvement in agency decision-making.

The Act requires federal agencies to prepare a detailed environmental evaluation for any major federal action with the potential to significantly affect the quality of the human environment. As with the Magnuson-Stevens Act, NEPA requires an assessment of both the biological and social/economic consequences of fisheries management alternatives, in order to provide the public an opportunity to be involved and influence decision-making on federal actions.

Endangered Species Act

The Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*), passed in 1973 and reauthorized in 1988, provides broad protection for fish and wildlife species that are listed as threatened or endangered. Provisions are made for the formal listing of species, development of recovery plans, and designation of critical habitats. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize species. Responsibilities for implementing the ESA are shared by the U.S. Fish and Wildlife Service (USFWS; freshwater fish, birds, terrestrial mammals, and plants) and NMFS (anadromous and marine fish, marine mammals, sea grasses). NMFS is therefore tasked with both managing the groundfish harvest through FMPs, and ensuring that identified threatened and endangered species (e.g., the Steller sea lion) receive appropriate consideration and protection during the planning and implementation of groundfish harvests.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA**)** of 1972 (16 U.S.C. 1361 *et seq*.), as amended through 1996, establishes a federal responsibility to conserve marine mammals; management responsibility for cetaceans (whales) and pinnipeds (seals) other than walrus is vested with NMFS. The USFWS is responsible for all other marine mammals in Alaska including sea otter, walrus, and polar bear.

2.4 Processing and Transhipment

In the Gulf of Alaska fishery, all vessels catch and deliver. The probability of illegally landed fish entering the market from the vessels in this category is not as low as catcher/processor vessels from the Bering Sea, but is still considered low due to the oversight and enforcement provided. Catcher vessels also have observer coverage, but not as intense as in the Bering Sea.

No chain of custody audits for compliance with MSC requirements were conducted as part of this fishery assessment.

3.0 THE ASSESSMENT PROCESS

Scientific Certification Systems, Inc. conducted a pre-assessment of the pollock fisheries in 2000. In 2001 the formal, full assessment of the Eastern Bering Sea and Aleutian Islands fishery commenced. Soon after the initiation of the Bering Sea assessment, an agreement was reached between Scientific Certification Systems, Inc. and the At-Sea Processors Association (representing other fishing and processing interests in the Gulf of Alaska fishery), to include the GOA fishery on a parallel track to the Bering Sea assessment. All aspects of the assessment process were carried out under the auspices of Scientific Certification Systems, Inc., an accredited MSC certification body, and in direct accordance with MSC requirements.

Many aspects of this assessment went beyond the minimum requirements of the MSC. This happened, for the most part, because a number of organizations in the conservation community in the Pacific Northwest are highly critical of the pollock fishery and have raised many questions about the fishery's ecological and social impacts. These conservation groups have formed coalitions to exchange information and to discuss how best to engage the fishery management system to voice their concerns about compliance with state and federal regulations, as well as the proper application of conservation measures to protect the marine ecosystems. Some of the conservation groups have also brought litigation in federal courts where they have challenged management of the fishery by the National Marine Fisheries Service on a number of occasions, asserting that fishery managers failed to comply with US law applicable to pollock fisheries, particularly NEPA and the ESA.

In order to ensure a thorough and robust assessment process, and a process in which all interested stakeholders could and would participate, SCS took the approach of allowing additional time as needed for both industry and stakeholders to respond to requests for information and participation. Although criticized for this approach by some who were concerned that the process was being unduly influenced by stakeholders, SCS felt the added time was necessary to ensure continued cooperation and participation by all parties throughout the process. In reality, it often took the applicants longer than any other group to respond to requests for information due to the vast amount of data and analyses that had to be summarized.

To be thorough and transparent, SCS provided opportunities for input at all stages of the assessment process, whether required or not by MSC procedures. The general steps followed were:

- Team Selection
  At this first step of the assessment process, SCS sought significant input from interested parties. Stakeholder input was sought because it was imperative in a controversial fishery, such as the pollock fishery, that all participants agreed that the assessment team was competent and able to carry out an independent and transparent evaluation. SCS sent out an advisory through direct email, fax, listing on email list servers, and posting on select web sites requesting nominations for persons capable of providing the expertise needed in the pollock assessment. Nominations were compiled and a second advisory released (through the same mechanisms) listing the nominees by expertise and requesting comments on each nominee's acceptability. Comments were compiled and a short list of nominees selected by cross referencing those nominees identified as acceptable by the largest number of stakeholders. A third advisory was then released identifying nominees selected for the short list and further comments on their acceptability were requested. SCS compiled the last set of comments, made several phone calls to stakeholders to clarify any remaining issues, and selected a final team of 3 people for the assessment team. The entire selection process took nearly 6 months to complete.

- Setting Performance Indicators and Scoring Guideposts
  As required by the MSC assessment process, the assessment team drafted a set of performance indicators and scoring guideposts to correspond to the MSC Principles and Criteria. These were posted for a comment period that lasted 45 days. A second drafting was also placed for stakeholder comment for a period of several weeks. This second release was provided to allow stakeholders to comment on some additional changes that were made to the performance indicators and scoring guideposts. In the initial draft released, SCS did not include 60 level scoring guideposts. This decision was based on interpretation of the MSC requirements as described in the MSC methodology document and the MSC Accreditation Manual. However, upon deliberations with the MSC, SCS was required to add 60 level scoring guideposts to facilitate the assessment process, and as a result these were added to the 2nd release of the draft performance indicators.

- Discussion of Assessment Process and Timing
  It is not required under the MSC process to discuss with stakeholder the timing and steps that are to be used to seek input to the evaluation process. However, it became clear during the first two steps in the process that the SCS assessment team was going to be receiving stakeholder input from two main sources - World Wildlife Fund (WWF) and Alaska Oceans Network (AON) – both taking lead roles in responding to requests for information by SCS and representing the interests of a variety of other stakeholders in the conservation community. The small number of respondents allowed SCS to inquire about the selection of meeting dates and to discuss the opportunities for input on an ongoing basis. This opened up and increased the

discussions with stakeholder groups, allowing SCS to gather far more stakeholder information than would normally be available during an assessment process.

- Input on fishery performance
  Once performance indicators were finalized, SCS requested that the applicants, led by the At Sea Processors Association, compile and submit written information to the assessment team illustrating the fishery's compliance with the required performance indicators. At the same time, SCS requested WWF and AON to compile and submit whatever written information they believed to be pertinent to the assessment. The applicants required six months to complete their compilation and submission. WWF and AON were able to submit information over a two- month period. Given the fishery is one of the largest in the world with an extraordinary amount of data collection, data analyses, and management documents, the applicants needed much more time in order to compile and summarize the immense amount of available and pertinent information. During the process of getting written input about the fishery, the stakeholders made a formal request to view the information compiled and submitted by industry; however, the applicants were not inclined to comply with this request. As a result, SCS was unable to release the information due to confidentiality clauses in the assessment contract.

- Meetings with industry, managers, and stakeholders
  SCS planned for and conducted multiple meetings with stakeholders, industry, fishery managers, and fishery scientists. Multiple meetings were necessary due to the scale and complexity of the fishery. As the assessment team reviewed submitted written materials, a series of issues needing clarification were identified. Each meeting with fishing organizations, fisheries scientists, fishery managers, and stakeholders was set to obtain additional clarifications until the assessment team felt it had obtained the necessary understanding of the information associated with the fishery to complete its assessment. The majority of meetings were held between September 2001 and May 2002.

- Scoring fishery
  The assessment team scored the fishery using the required MSC methodology and without input from the client group or stakeholders.

- Drafting report
  The assessment team in collaboration with the SCS lead assessor, Chet Chaffee, drafted the report in accordance with MSC required process. A draft of content sections regarding the fishery's performance, without scores or weights from the numerical evaluation process, was provided to the client for comment on the accuracy of the stated facts. The assessment team did not solicit, nor did it respond to, comments on style or on the assessment team's interpretations of information.

- Selection of peer reviewers
  SCS, as required, released an announcement of potential peer reviewers soliciting comment from stakeholders on the merit of the selected reviewers. To make the

process efficient, SCS selected peer reviewers from the short list of acceptable scientists originally developed to select assessment team members. This guaranteed both the client group and the stakeholder group that they would be familiar and favorable toward the selected peer reviewers.

- Public Comment on Draft Report
  The MSC requirements are that the draft report be made available for public comment for a period of no less than 30 days. There is no formal requirement that the public comment period be held before, after, or during the peer review process. While the MSC intends to set a formal step-wise process, it has yet to do so leaving the decision to the certifier. Since the pollock evaluation process has taken more than 2.5 years, SCS decided to have the public comment and peer review processes in parallel to avoid further delays. SCS has received both informal and formal requests from stakeholders to extend the public comment period in order to allow sufficient time for comment. SCS has notified all interested parties that it will only entertain requests for additional time from individuals or organizations that make an earnest effort to comment in the required time frame and submit at least a partial set of comments.

Due to the decisions made by the SCS project manager to be responsive to all stakeholders, the assessment process for pollock lasted much longer, just over 2.5 years, than other assessments under the MSC program. Both the client group and stakeholder group are to be commended for upholding their parts in the assessment over this extended time period and for their thoroughness in gathering and summarizing vast amounts of information for the assessment team.

3.1 Evaluation team

Fishery Project Manager: Dr. Chet Chaffee, SCS (USA)

Dr. Chaffee is currently Vice President of Environmental Programs at Scientific Certification Systems, Inc. of Oakland, California, USA. Dr. Chaffee has worked with scientists in 7 countries to complete more than 20 MSC pre-assessments on small and large fisheries and has worked on 11 full fishery evaluation projects that encompass more than 25 fisheries. Dr. Chaffee has assisted the MSC in the development of its certification methods, is co-editor of the first book on fishery certification (with Dr. Trevor Ward and Dr. Bruce Phillips), and has conducted or managed more than 25 projects evaluating MSC Chain of Custody certifications for processors in 9 countries.

Assessor: Dr. Tony Smith (CSIRO, Australia) Principle 1

Dr. Smith has more than 15 years experience in stock assessment and evaluation of fisheries management. Currently, Dr. Smith works as Senior Principal Research Scientist, CSIRO Division of Marine Research, Hobart, Australia. Dr. Smith is internationally recognized for his expertise in stock assessment and harvest strategy evaluation, and most recently has started developing methods to look at ecosystem effects from fishing. Dr. Smith has worked on fisheries in a number of areas around the world as well as on international panels with

ICES and FAO. Dr. Smith is also knowledgeable about MSC processes having worked on an assessment of the Western Australia Rock Lobster Fishery and participated in MSC workshops on developing and interpreting performance indicators for use in fishery assessments.

Assessor: Dr. Robert Furness (Scotland) Principle 2

Dr. Furness is currently Professor of Seabird and Fishing Interactions in the Institute of Biomedical and Life Sciences at the University of Glasgow, Scotland. Dr. Furness has over 25 years experience working on seabird ecology, with specific emphasis on fishery interaction over the past decade. Dr. Furness participates in a number of working groups on seabird ecology and fishery interactions with ICES, FAO, and a number of national committees.

Assessor: Mr. Tom Jensen (United States) Principle 3

Mr. Jensen is a partner in the law firm of Sonnenschein, Nath, & Roenthal LLP in the Washington, DC office. He represents private and public sector clients on a range of environmental and energy-related matters. Mr. Jensen has a thorough knowledge of the U.S. fishery management system and in addition to his familiarity with the Magnuson-Stevens Fishery Conservation and Management Act, he is a recognized expert on the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA). He serves as Chair to the Federal Advisory Committee to the U.S. Institute for Environmental Conflict Resolution.

Prior to joining Sonnenschein, Nath & Rosenthal LLP, Mr. Jensen was with Troutman Sanders LLP Environmenta and Natural Resource Management Practice. Mr. Jensen also served previously as Associate Director for Natural Resources at the White House Council on Environmental Quality (CEQ) from 1995-1997, where his work included advising the U.S. President and Vice President and senior White House staff on natural resource policies and legislation, including property rights, protected species, wetlands, forestry, public lands, water resources, military base realignment, low level radioactive waste, Indian tribal rights, and other issues.. Mr. Jensen also was Deputy Secretary of the U.S.-Canada Pacific Salmon Commission (1987-1989) and served as the Majority Counsel to the U.S. Senate Committee on Energy and Natural Resources Subcommittee on Water and Power, 1989-1992. He was Policy Advisor to the Columbia River Inter-Tribal Fish Commission from 1982-1987. He is a graduate of Northwestern School of Law of Lewis and Clark College, and holds his undergraduate degree in history from the University of Southern California.

3.2 Other Fisheries in the area and summary of previous certification evaluations

A number of other fisheries operate in and adjacent to the Gulf of Alaska including, but not limited to:

1. longline fisheries for Pacific halibut, Pacific cod, black cod or sablefish and a variety of other groundfish species;
2. troll fisheries for salmon;

3. gillnet, set net and purse seine fisheries for salmon and herring,
4. trawl fisheries for various bottom fish species other than pollock; and
5. pot fisheries for king, Tanner and Dungeness crabs and Pacific cod, and
6. the pollock fishery in the Bering Sea and Aleutian Islands.

Minor fisheries for some other species, such as snails, scallops, sea cucumbers, sea urchins, also exist. Also in the past a large trawl fishery for Pandalid shrimps occurred in the Gulf of Alaska and Eastern Bering Sea. Catch and other descriptive material on these fisheries can be found in NPFMC documents, from the Alaska Department of Fish and Game (ADF&G), and Alverson (1992).

The closest MSC certified fisheries to the GOA pollock fishery are the commercial salmon fisheries that occur in Alaska's state waters. There are ongoing certification efforts for two other fisheries in the general area; the North Pacific Halibut Fishery and the Alaska Black Cod Fishery. The pollock fisheries are the first official evaluations of any fisheries in the areas, or on any federally managed US fishery, by a third party using the MSC Principles & Criteria as the evaluation standard. No other fisheries in the general area are engaged in MSC processes to the knowledge of the certification body.

4.0 THE MSC EVALUATION PROCESS

The Marine Stewardship Council standards for sustainable fisheries management were developed through an 18-month process (May, Leadbitter, Sutton, and Weber, 2003). An original draft was developed by an expert working group, which met in Bagshot, UK in 1996. The draft standard was then presented through a series of 8 workshops that lasted 3 days each. Comments from the workshops, and from written submissions to the MSC were compiled and made available to a second expert working group at Airlie House in Virginia, USA.

The final MSC standard (see below) was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program. The Gulf of Alaska fishery was evaluated using this standard.

The scope of the MSC Principles and Criteria relates to marine fisheries activities up to but not beyond the point at which the fish are landed. The MSC Principles and Criteria apply at this stage only to marine fishes and invertebrates (including, but not limited to shellfish, crustaceans and cephalopods). Aquaculture, freshwater fisheries, and the harvest of other species are not currently included. Issues involving allocation of quotas and access to marine resources are considered to be beyond the scope of these Principles and Criteria.

4.1 MSC Principles and Criteria

MSC PRINCIPLE 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent:
The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

MSC Criteria

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

MSC PRINCIPLE 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent:
The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

MSC Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

MSC PRINCIPLE 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent:
The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

MSC Criteria:

A. Management System:
The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:
1. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisinal, and fishing-dependent communities shall be addressed as part of this process;
2. be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings;
3. observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability;
4. incorporates an appropriate mechanism for the resolution of disputes arising within the system;
5. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
6. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
7. incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion;
8. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;

9. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
10. setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
11. identifying appropriate fishing methods that minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
12. providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
13. mechanisms in place to limit or close fisheries when designated catch limits are reached;
14. establishing no-take zones where appropriate;
15. contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. MSC Operational Criteria:
Fishing operations shall:

16. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimize mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
17. implement appropriate fishing methods designed to minimize adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
18. not use destructive fishing practices such as fishing with poisons or explosives;
19. minimize operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
20. be conducted in compliance with the fishery management system and all legal and administrative requirements; and
21. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

4.2 Interpretation of MSC Principles for Performance Evaluations

Along with developing a standard for sustainable fisheries management, the MSC also developed a certification methodology that provides the process by which all fisheries are to be evaluated. The MSC accredits certification bodies (businesses) that can show that the expertise and experience necessary to carry out MSC evaluation is present in the organization. In addition, each certification body must demonstrate its fluency with the MSC standards and evaluation methods through the use of these in a fishery evaluation

The methods are provided in great detail through documents that can be downloaded from the MSC website (www.msc.org). At present, the Fisheries Certification Methodology is in its 3rd version and under review for additional changes in order to keep pace with lessons learned during previous certifications.

The MSC Principles and Criteria are general statements describing what aspects need to be present in fisheries to indicate that they are moving toward sustainable management. The certification approach or methodology adopted by the MSC requires that any assessment of a fishery or fisheries move beyond a management verification program that simply provides third-party assurances that a company's stated management policies are being implemented. The MSC's 'Certification Methodology' is designed to be an evaluation of a fishery's performance to determine if the fishery is being managed consistent with emerging international standards of sustainable fisheries.

Using its expertise in fisheries management, fisheries biology and ecology, ecosystem monitoring, and stock assessments, the assessment team developed a set of performance indicators (see Section 7) to be consistent with the intent and extent of the MSC Principles and Criteria.

The performance indicators developed for MSC Principles 1 and 2 are structured such that all the Subcriteria and Performance Indicators are directly associated with a single MSC Criterion within a Principle. There is no duplication of Performance Indicators among MSC Criteria or MSC Principles.

In instances where a single Performance Indicator could be used for more than one MSC Criterion or MSC Principle, the Evaluation Team chose to utilize the indicator only once. For example, there was opportunity for substantial overlap and therefore duplication in Performance Indicators under the MSC Criteria for MSC Principle 1. The Evaluation Team noted this and built the Performance Indicators for MSC Criterion 1 first using a logical hierarchy based on the intent and structure of the MSC Criteria. In the development of Performance Indicators for MSC Criteria 2 and 3, the Evaluation Team only listed additional Performance Indicators that were of a distinct nature, avoiding the duplication of measures used under MSC Criterion 1.

The structure of the Subcriteria and Performance Indicators developed under MSC Principle 3 is somewhat different. Under MSC Principle 3, the Evaluation Team noted significant difficulty in developing a logical hierarchy of measures that remained unique to each MSC Criterion but also maintained a logical connection between indicators. Much of the difficulty stemmed from the fact that the 17 MSC Criteria under MSC Principle 3 vary in nature from general objectives to specific measures, but are not presented in a hierarchical framework from the very broad to the specific. Instead, the 17 MSC Criteria under MSC Principle 3 describe factors with significant redundancy. As a result, the Evaluation Team felt it would be better to construct a logical hierarchy that incorporates all the requirements spelled out by the 17 MSC Criteria and note the relationship of each Performance Indicator to the various MSC Criteria, as many of the Performance Indicators proposed can be linked to a more than one MSC Criterion.

We note this difference in structure under MSC Principle 3 due to the fact that the hierarchical structure of Performance Indicators under any given Principle can have a significant effect on the outcome of the scoring process. As a result, the Evaluation Team restructured the hierarchy so that each indicator's score is assigned to the appropriate MSC Criteria under

Principle 3, and that the score for any given indicator is repeated for the criteria where the score is applicable. The MSC Criteria associated with each individual performance indicator are listed in brackets after the indicator (see Section 7, MSC Principle 3). This process was used by the Evaluation Team specifically to make clear how it handled the duplication inherent in the MSC Criteria under MSC Principle 3.

4.3 Submission of Data on the Fishery

One of the most significant, and difficult, aspects of the MSC certification process is ensuring that the assessment team gets a complete and thorough grounding in all aspects of the fishery under evaluation. In even the smallest fishery, this is no easy task as the assessment team typically needs information that is fully supported by documentation in all areas of the fishery from the status of stocks, to ecosystem impacts, to management processes and procedures. In the pollock fisheries, this also meant providing additional documentation for a number of lawsuits directed specifically at pollock and groundfish fisheries in the Bering Sea and Gulf of Alaska.

Under the MSC program, it is the responsibility of the applying organizations or individuals to provide the information required by the assessment team. It is also the responsibility of the applicants to ensure that the assessment team has access to any and all scientists, managers, and fishers that the assessment team identifies as necessary to interview in its effort to properly understand the functions associated with the management of the fishery. Last, it is the responsibility of the assessment team to make contact with stakeholders that are known to be interested, or actively engaged in issues associated with fisheries in the same geographic location.

In the pollock fisheries, there were 76 performance indicators the applicants were required to answer with documented information and data, including legal documents associated with past and present legal pleadings. Moreover, the applicants had to coordinate meetings with a significant number of scientists and managers associated with the day to day management of this fishery in three locations: Seattle, Washington; Juneau, Alaska; and Anchorage, Alaska. In summary, the applicants for this project had an enormous task in front of them to compile information and data on the largest US fishery, and one of the largest commercial fisheries in the world, and make sure the assessment team could interview whoever was necessary to explain the procedures and processes associated with fishing and fishery management. In the end, the applicant submitted to the assessment team written summaries that exceeded 1300 pages. With supporting documentation from electronic versions of documents available on the web, the number of pages of data and documentation submitted on the pollock fisheries must certainly number in the hundreds of thousands.

In contrast to the applicant’s role in MSC assessments, the stakeholders in the fishery are under no specific obligation, other than personal responsibility, to provide the assessment team with information. Yet the information that stakeholders provide is essential in the process as it often provides a very different view of the successes and failures of the management system coming from people and organizations outside the fishing and management organizations. In some cases it may even be that a stakeholder considers it to be against the stakeholder's interest to participate in an MSC assessment process, especially in those instances where the stakeholder feels the fishery management is flawed and has taken specific actions to change fishery management processes or practices. In the pollock fishery, it is certainly the case that certain stakeholders believe there are problems with the fishery management system, and these stakeholders notified SCS that participation in the assessment process was difficult for them as a result. Regardless, the stakeholders did decide to participate cooperatively, which greatly enhanced the assessment team's understanding of the issues associated with the pollock fisheries. A summary of stakeholder provided information is found in Section 6 of this report.

5 ASSESSMENT TEAM MEETINGS AND INTERVIEWS

5.1 Justification for selection of items/persons inspected.

The sites and people chosen for visits and interviews were based on the assessment team's need to acquire information about the management operations of the fisheries under evaluation. As all fishery resources are a public resource, they are managed by government agencies. Agencies and their respective personnel responsible for fishery management, fisheries research, fisheries compliance, and habitat protection were identified and contacted with the assistance of the client group and stakeholders. In addition, professional fisher's associations and industry associations were identified and contacted.

5.2 Fishing industry and fishery management meetings

The assessment team met with APA staff, APA members, and members of other fishing and processing organizations on numerous occasions between September 2000 and May 2002. A number of meetings were simply held to organize additional meetings and to clarify issues relating to data submissions to the evaluation team, while other meetings were so SCS could be briefed on specific issues from allocation of effort among different portions of the fishing season, to regulatory compliance. In addition, the evaluation team met with other members of the fishing industry to collect information on vessel operations and on Community Development Quota (CDQ) holders. SCS also met with NMFS personnel to discuss the scientific research and analyses provided in support of the fishery. In addition to the meetings that were held, a significant number of exchanges happened by email and by phone with many of the same people and organizations listed below in an attempt to clarify issues/concerns or in pursuit of specific data identified as missing and important during the assessment team's review. Table 2 below is a list of the significant meetings held with fishing industry participants, NMFS scientists, NMFS fishery managers, and North Pacific Fishery Management Council staff.

Table 2. List of industry and management personnel interviewed for the project.

4/20/01	**Pre-assessment, NMFS Low-Lee Loh, Rich Marasco, Jim Ianelli, Jim Coe**		**Stock assessments, ecosystem interactions, Steller sea lions**
9/7/01	**Initial Meeting, NMFS, Jim Coe and a number of NMFS scientists**		**General introduction to MSC Assessment process**
9/12/01	**Jim Coe**	**NMFS AFSC OCD**	**Explain MSC Process, interview available personnel, and obtain documents and reports.**
	Gary Stauffer	**NMFS AFSC RACE**	
	Dave Somerton	**NMFS AFSC RACE**	
	Bill Karp	**NMFS AFSC REFM**	
	Pat Livingston	**NMFS AFSC REFM**	
	Anne Hollowed	**NMFS AFSC REFM**	
	Lowell Fritz	**NMFS AFSC NMML**	
	Chuck Fowler	**NMFS AFSC NMML**	
	Brian Fadely	**NMFS AFSC NMML**	
11/26/01 and 11/27/01	• **Eric Brown**	**NMFS AFSC REFM**	**Trawl surveys**
	• **Gary Walters**	**NMFS AFSC REFM**	**Trawl Surveys**
	• **Chris Wilson**	**NMFS AFSC REFM**	**Hydroacoustic Survey**
	• **Neil Williamson**	**NMFS AFSC REFM**	**Hydroacoustic Survey**
	• **Martin Dorn**	**NMFS AFSC REFM**	**Stock Assessment**
	• **Anne Hollowed**	**NMFS AFSC REFM**	**Stock Assessment**
	• **Lowell Fritz**	**NMFS AFSC OCD**	**Stock assessment and ecosystem**
12/12/01	**Meeting with APA, PSPA, and other industry participants**		**General discussion of MSC process**
4/29/02	• **Dr. Joe Terry**	**NMFS AFSC REFM**	**Bycatch**
	• **Martin Loefflad**	**NMFS AFSC Observer Program**	**Bycatch**
			Ecosystem
	• **Pat Livingston**	**NMFS AFSC REFM**	**Bycatch**
	• **Sarah Gaichas**	**NMFS AFSC REFM**	**Ecosystem**
	• **Lowell Fritz**	**NMFS AFSC OCD**	**Ecosystem**
	• **Chuck Fowler**	**NMFS AFSC NMML**	**Ecosystem**
	• **Libby Logerwell**	**NMFS AFSC REFM**	**Ecosystem**
	• **Beth Sinclair**	**NMFS AFSC NMML**	**Ecosystem**
	• **Bruce Robson**	**NMFS AFSC NMML**	**Ecosystem**
	• **Rich Ferrero**	**NMFS AFSC OCD**	
	• **Bob McConnaughey**	**NMFS AFSC RACE**	**EFH Gear, gear-Seabed interactions**
	• **Craig Rose**	**NMFS AFSC RACE**	
4/30/02	• **Jim Ianelli**	**NMFS AFSC REFM**	**Stock Assessment**
	• **Low-lee Loh**	**NMFS AFSC REFM**	**Stock Assessment**
	• **Mike Canino**	**NMFS AFSC RACE**	**Genetics, fecundity**
	• **Sarah Hinckley**	**NMFS AFSC RACE**	**Life history pollock**
	• **Kevin Bailey**	**NMFS AFSC RACE**	
	• **Jeremy Sterling**	**NMFS AFSC NMML**	**Fur Seal Telemetry**
	• **Vladamir Burkanov**	**Visiting Russian Scientist**	**Sea Lion- Fishery Interactions**
	• **Frank Vargas**	**American Seafoods**	
5/1/02	• **Kim Dietrich**	**Observer Pollock fishery**	**Vessel Inspection Bycatch**
	• **Dr. Rich Marasco**	**NMFS AFSC REFM**	**SSC, REFM management**
	• **Grant Thompson**	**NMFA AFSC REFM**	**Stock Assessment**
	• **Dr. Kerim Aydin**	**NMFS AFSC REFM**	**Ecosystem modeling**
	• **Jon Pollard**	**NMFS Juneau, Reg. Office**	**Reg., Compliance**
5/2/02	• **Sue Salveson**	**NMFS Juneau, Reg. Office**	**Sust. Fisheries**

	• **Mike Payne**	**NMFS Juneau, Reg. Office**	**Protected Resources**
	• **Tamra Faris**	**NMFS Juneau, Reg. Office**	**NEPA Coordinator**
	• **Ted Meyers**	**NMFS Juneau, Reg. Office**	**Habitat**
	• **Sheela V. McLean**	**NMFS Juneau, Reg. Office**	**Public Relations**
	• **Ron Berg**	**NMFS Juneau, Reg. Office**	**Deputy Director NMFS**
	• **Kim Rivera**	**NMFS Juneau, Reg. Office**	**Seabird Interactions, Protected Species**
	• **Larry Cotter**	**CEO Aleutian Pribilof Island Community Development Association**	**Socioeconomics and management**
5/3/02	• **Coastal Villages Region Fund, Morgen Crow, Executive Director**		**Socio-economics and management**
	• **Norton Sound Economic Development Corporation, Eugene Asicksik, President/C.E.O.**		**Socio-economics And management**
	• **Julie Anorek**	**USFWS**	**Seabird interactions**
	• **Steve Davis**	**NMFS Anchorage**	**NEPA**
	• **Shane Capron**	**NMFS Anchorage**	**Protected Species**
	• **Dave Witherall**	**NP Council Anchorage**	**NPFMC Process**
5/20/02	**Conference call, APA attorneys**		**Discussion of legal framework for fishery**
9/9/02 and 9/10/02	**Plan Team Meeting**		**Bering Sea and Gulf of Alaska**

5.3 Stakeholder meetings and interviews

Stakeholders other than those in industry and government were also consulted throughout the process. For the most part, stakeholders in the conservation sector funneled information to the assessment team through two organizations; World Wildlife Fund and Alaska Oceans Network. Both of these organizations made personnel or representatives available for discussion throughout the assessment process. As a result, members of the assessment team, including the SCS project manager (Chet Chaffee) had a great many exchanges with both organizations. Most of the exchanges occurred by phone and by email. For WWF, exchanges primarily occurred with Scott Burns and Suzanne Iudicello Martley. The person most contacted for AON was Stacey Marz who had been hired to be the liaison to the SCS assessment team; however, other exchanges did occur with Janis Searles (Earth Justice), Jack Stearne (Trustees for Alaska), Peter Van Tuyn (Trustees for Alaska), and Ken Stump (consultant for AON).

Specific meetings held with members of the conservation community and other non-industry stakeholders are listed in Table 3 below.

Table 3. Meetings with conservation organization and other non-industry stakeholders.

9/13/01	**Ken Stump** **Stacey Marz (phone)**	**Alaska Oceans Network (AON)**
5/1/02	**Ken Stump**	**Consultant to Conservation Sector**
	Scott Burns	**WWF**
	Suzanne Iudicello Martley	**Consultant to WWF**
5/3/02	**Larry Merculieff**	**Bering Sea Council of Elders**
	Janis Searles	**Earthjustice**
	Dorothy Childers	**AMCC**
	Dave Cline	**WWF Field Office, Anchorage, AK**
	Jack Sterne	**Trustees for Alaska**
	Karin Holser	**Pribilof Islands Stewardship Council**
	Peter Van Tuyn	**Trustees for Alaska**
	David McCormick	**Trustees for Alaska**
	Shelley Johnson	**AON**
	Linda Behnken	**Longline Fisherman's Association**
	Ken Stump	**Consultant**
	Stacey Marz	**AON**
5/20/02	**Janis Searles (phone**	**Earth Justice**
	conference)	**Trustees for Alaska**
	Jack Stearne (phone	**Consultant**
	conference)	
	Ken Stump	

6 STAKEHOLDER CONCERNS

To ensure that the evaluation team had a full understanding of stakeholder concerns, SCS published advisories asking stakeholders to provide written input to the assessment team prior to arranging meetings. Advisories were published on the MSC website and several email listservers to guarantee the widest distribution possible. In addition, SCS sent the advisories by email and fax to known stakeholders.

SCS received some written submissions; however, the submissions from WWF and AON overshadowed all the rest and cover much of the concerns expressed by other conservationists.

WWF, using several consulting scientists, prepared a report to the assessment team of 160 pages and the Alaska Oceans Network submitted a report of slightly more than 120 pages.

Summaries of the submissions from conservation stakeholders do not do justice to the many concerns raised. Although we provide a summary below, the full WWF and AON submissions can be found in Appendix 1 and Appendix 2.

6.1 WWF Report to the Assessment Team

The WWF submission to the assessment team was a single submission applicable to both the Bering Sea/Aleutian Islands fishery as well as the Gulf of Alaska fishery.

The most efficient way to summarize the major points made in the WWF report is to quote directly from the document. According to the Executive Summary of the WWF report:

“The ten issues are:

1. Stock assessment modeling is state-of-the-art, but assessments could be improved with additional calculations predicting the probability of overfishing under current control rules.

2. Incomplete knowledge about the effects of fishing on population and ecosystem structure, and about the structure of Bering Sea pollock and fishing mortality in Russian waters, creates uncertainty about appropriate exploitation rates.

3. The observer system currently used in the Alaska pollock fishery is one of the best in the world. But improvements could be made in several areas.

4. Incomplete knowledge of environmental influences on stock dynamics and of the effects of fishing on ecosystem structure makes it difficult for managers to clearly distinguish the relative effects of natural and anthropogenic factors on stock dynamics and ecosystems, or to predict how changes in ocean climate will affect stocks and ecosystems in the future.

5. Bycatch reduction and monitoring programs are effective. But bycatch reporting could be improved.

6. Incomplete knowledge about the trophic relationships among pollock and other species in the Bering Sea and Gulf of Alaska ecosystems makes it difficult to determine management strategies that are optimal for preserving critical relationships.

7. Uncertainties regarding the impact of the pollock fishery on the protected Steller sea lion have made it difficult to implement regulatory measures that are certain to protect this listed species and that comply with U.S. environmental laws.

8. In setting objectives for the fishery, managers have not until recently incorporated ecosystem objectives that encompass species and habitats beyond the target stock.

9. Traditional fishery management approaches, along with constraints on resources and unclear guidance, have weakened compliance with administrative procedures and environmental protection laws other than the Magnuson-Stevens Fishery Conservation and Management Act.

10. The fishery management system responds to stakeholder concerns on an ad-hoc basis, rather than considering them in the context of the goals and values of all stakeholders over the long term.

We recommend that:

1. Managers consider the benefits of adding an additional step to Gulf of Alaska assessments that would calculate the probability that various catch scenarios would be capable of maintaining fishing mortality and spawning stock biomass within threshold levels. The length of these projections should be determined by fishery analysts, but, at minimum, should equal the life span of the fish.

2. The evaluation team and managers examine the effect on population structure of the concentration of pollock fishing in time and space. Changes in mean age have been relatively slight compared to interannual variation in mean age for walleye pollock in the Gulf of Alaska. The evaluation team should examine whether the age structure of the Bering Sea stock has changed in response to fishing pressure. More research is needed on the reproductive biology of pollock to improve understanding of the effects of fishing on reproductive capacity. And managers should pursue ongoing work with Russian scientists to define stock structure and to improve understanding of genetic variations of pollock throughout the Bering Sea.

3. The National Marine Fisheries Service develop a mechanism under which the agency has direct control over the coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage.

4. Researchers continue to focus on better understanding the effects of environmental variability on stock dynamics, and that they designate no fishing areas that can be used to study the effects of fishing on ecosystem structure and to evaluate the impact of conservation measures on marine ecosystems, particularly on the predators of pollock. We also recommend that managers incorporate new information derived from these studies into stock assessments and ecological analyses. Recognizing, however, that no

amount of money or research will eliminate all uncertainty, the management system should move away from an emphasis on predicting the most likely outcome. Instead, fishery managers should make much more use of scenario planning and other well developed tools that aid in developing management strategies that are robust under several possible futures. Though the draft Programmatic Environmental Impact Statement defines alternative management approaches, those approaches are considered independently and do not incorporate the more fully developed planning methods used in business, the military, crisis planning, and policy analysis.

5. Managers consider summarizing and publishing incidental catch and discards data at the fishery, as well as single-species, level to help the public to better understand the impacts of individual fisheries on non-target species.

6. The evaluation team consider current efforts to investigate concerns related to the impacts of the pollock fishery on the pelagic food web through multispecies and ecosystem modeling, and to incorporate in the Stock Assessment and Fishery Evaluation report's Ecosystem Considerations chapter a set of indicators of ecosystem status and trends that could eventually provide an early warning of adverse changes in the ecosystem.

7. The evaluation team keeps abreast of research developments that provide improved understanding of the impact of the pollock fishery on the protected Steller sea lion, and that fishery managers adapt regulations to address new information as it becomes available. In addition, it would benefit the management system to be more "adaptive" and less "reactive." Providing scientists and managers greater flexibility to experiment and test different hypotheses could help to resolve current uncertainties. While the fishery management system has become more flexible and responsive to new information, the concept of actively and intentionally probing the system has, for the most part, been lost. In some cases, this may mean pursuing incidental take permits for scientific purposes, or using other tools in the Endangered Species Act to allow carefully controlled takes of protected species at risk in local situations (e.g., by fishing near some sea lion rookeries and not others). Where the knowledge payoff would be great, leading to better conservation and management of the ecosystem, ways should be found to carry out meaningful field experiments using the fishery.

8. The evaluation team examines plans and timetables for the new Programmatic Environmental Impact Statement, and inquires of managers and of the applicants how the performance of new conservation approaches will be evaluated. The team should also take into consideration the actions of managers over the past several years to protect forage species and habitat, and to reduce the take of non-target species. The evaluation team should also keep abreast of efforts to complete the Supplemental Environmental Impact Statement required to comply with legal mandates to designate essential fish habitat and to minimize the impacts of fishing on essential fish habitat.
Managers should examine, under the framework that provides for the designation of habitat areas of particular concern, the potential for marine protected areas in the Bering Sea and Gulf of Alaska to conserve marine biodiversity.

9. The evaluation team find out when the National Marine Fisheries Service's report to Congress on actions underway to improve compliance with the National Environmental Policy Act and other laws will be released, and that it evaluate the adequacy of proposed improvements, and the timetable for implementing those improvements.

10. The evaluation team assesses how the fishery management system as a whole builds in mechanisms to articulate the social, cultural, and economic values and goals of diverse fishery stakeholders, and to provide for flexibility to respond to large-scale ecological change."

6.2 Alaska Oceans Network Report to the Assessment Team

The Alaska Oceans Network (AON) submission to the assessment team was a single submission applicable to both the Bering Sea/Aleutian Islands fishery as well as the Gulf of Alaska fishery.

Summarizing the AON report is equally as difficult, and does not do justice to the full submission. However, to provide at least a sense of the concerns expressed by AON, we have provided excerpts from the Executive Summary of the AON Report to the assessment team.

"These fisheries are of special concern due to their enormous size, depleted stocks, and the importance of pollock in the marine food webs of both the Bering Sea and the Gulf of Alaska. "

"Although pollock yields have remained high throughout the period of U.S. management under the Magnuson-Stevens Act FMPs, intense spatial and temporal concentration of the pollock fisheries has been accompanied by a disturbing pattern of declines indicative of serial depletion. Episodes of intense pulse fishing on spawning stocks in the Shelikof Strait (1981-1985), Bogoslof/Aleutian Basin (1987-1992) and Aleutian Islands (1990s) have been followed by sharp declines in pollock abundance in each of those regions, as noted in successive National Marine Fisheries Service (NMFS) Biological Opinions. "

"Even the health of the eastern Bering Sea stock remains very much in question, despite apparently strong recruitment from the 1996 year-class in recent years."

"……….the Russian Navarin pollock fishery is targeting the same stock of fish, with unknown effects on subsequent recruitment to the spawning grounds on the eastern Bering Sea shelf. The model-projected spawning biomass for the Gulf of Alaska pollock is estimated to be only 26% of its equilibrium unfished biomass, well below the maximum sustainable yield reference level. Declining stocks, recruitment-driven fisheries, reliance on single year-classes, and profound uncertainties about stock structure all raise serious doubts about claims for sustainable single-species management. "

"All evidence indicates that predation on pollock by marine mammals, many seabirds, and many fishes in the North Pacific is extensive. At least fifteen species of marine mammals, thirteen species of seabirds, and ten fish species are known or believed to feed on pollock at either juvenile or adult phases of pollock's life history. NMFS has even characterized juvenile pollock as the dominant fish prey in the eastern Bering Sea.[1] "

"Despite the clear importance of pollock to the North Pacific food web, NMFS has never adequately evaluated and addressed the comprehensive effects of the fisheries on the marine ecosystems of the eastern Bering Sea, Aleutian Islands and Gulf of Alaska."

"In 1998 and 2000 …………. NMFS concluded that the pollock fisheries jeopardize the survival and recovery of the endangered western population of Steller sea lions and adversely modify sea lion critical habitat. Despite ongoing litigation under the Endangered Species Act and successive attempts to develop a mitigation plan, the fisheries continue to concentrate catches preferentially in sea lion critical habitat and are currently operating under emergency interim rules that expire in June 2002. "

"The current regulations and level of pollock fishing does not provide adequate security against the risk of overfishing in a single-species context and does not address impacts to the food web in an ecosystem context. The recommended fishing levels and regulations fail to adequately address the following key issues:

- Reliance on a few strong year classes of pollock in setting ABC and TAC levels
- Lack of consideration of uncertainties and unknown information in stock assessments and setting ABC and TAC levels
- Failure to address the needs of pollock predators in the ecosystem in setting ABC and TAC levels
- Large uncertainties about stock structure and stock rebuilding
- A pattern of serial depletion in regional pollock stocks
- Unresolved and unaddressed concerns regarding the Russian fishery in the Navarin Region of the Bering Sea
- Spatial and temporal compression of the pollock fisheries
- Failure to define overfishing in the ecosystem context
- Bycatch and discards of the pollock fisheries
- Excess capacity and overcapitalization of the pollock fleet
- Complying with the Endangered Species Act
- Complying with the National Environmental Policy Act ".

It is clear that the coalition of conservation groups that comprise AON are steadfastly against the certification of the Gulf of Alaska pollock fishery.

7 ASSESSMENT TEAM PERFORMANCE EVALUATIONS

After completing all the reviews and interviews, the assessment team is tasked with utilizing the information it has received to assess the performance of the fishery. Under the MSC

[1] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 3.

program, the process for assessing the fishery is performed by prioritizing and weighting the indicators relative to one another at each level of the performance hierarchy established when the assessment team developed the set of performance indicators and scoring guideposts for the fishery. Subsequent to this, the assessment team assigns numerical scores between 0 and 100 to each of the performance indicators. All of this is accomplished using decision support software known as Expert Choice, which utilizes a technique known as AHP (Analytical Hierarchy Process). A full description of the AHP process can be found on the MSC web site (www.msc.org). In essence, the process requires that all team members work together to discuss and evaluate the information they have received for a given performance indicator and come to a consensus decision on weights and scores. Scores and weights are then combined to get overall scores for each of the three MSC Principles. A fishery must have normalized scores of 80 or above on each of the three MSC Principles to be recommended for certification. Should an individual indicator receive a score of less than 80, a ‘Condition’ is established that when met, would bring the fishery’s performance for that indicator up to the 80 level score representing a well-managed fishery.

Below is a written explanation of the assessment team’s evaluation of the information it received and the team’s interpretation of the information as it pertains to the fishery’s compliance with the MSC Principles and Criteria.

MSC Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent:

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

INTRODUCTION

The purpose of this introduction is to provide the interested reader and potential reviewers with a brief overview of the fishery, our approach to assessing it under MSC Principle 1, and a summary of our findings for Principle 1. The evaluation of the fishery against the specific scoring indicators is described in detail below.

This report has been updated in the light of public and peer review comments received on the draft report released in September 2003. Reference is also made to some material made available since the release of the draft report, in particular the 2003 SAFE report (Dorn et al, 2003) and reviews of the surveys and assessment undertaken through the Center for Independent Experts (Godo, 2003; Haddon, 2003).

Walleye pollock (*Theragra chalcogramma*) is found across the north Pacific and into the Bering Sea. Fishing occurs mainly in the EEZs of the USA and the Russian Federation, though some high seas fishing also occurs. Within the US zone, fisheries for pollock are managed, along with other groundfish resources, by the North Pacific Fishery Management Council (NPFMC). Pollock are managed under two separate Fisheries Management Plans (FMPs): one for the Gulf of Alaska (GOA), and one for the Bering Sea and Aleutian Islands (BSAI). This assessment is restricted to consideration of the GOA fishery. While there is some doubt about spatial structure and stock boundaries for pollock in the North Pacific (Bailey at al, 1999), it is generally considered that Pollock form a single stock in the Gulf of Alaska.

Fishing for Pollock occurs exclusively by trawling. The GOA fleet uses mainly pelagic trawling, with about 90% of the catch taken by mid-water trawls. Information on the spatial distribution and effort levels of bottom trawling is not readily available. In proportional terms, by-catch rates are generally very low. Management of significant by-product species is considered under Principle 1, sub-criterion 1.2.

Under the GOA FMP, there is a complex set of regulations limiting exploitation of Pollock. These include time and area limitations on fishing, as well as limitations on vessels and gear, by-catch and discards. However the most important element regulating Pollock exploitation is the annual setting of quotas or Total Allowable Catch (TACs). TACs are set by the NPFMC following scientific advice on acceptable biological catches (ABCs). These in turn are based on a prescribed set of calculations known as the "tier system". This system is applied to the management of all groundfish resources under the FMP, and specifies six "levels" for calculating ABCs, with the calculations (harvest control rules) varying depending on the quantity and quality of information available. The GOA stock is managed at level 3 in the tier system. A full description of the tier system is available at NMFS (2001).

The standards adopted in this evaluation (expressed in the scoring indicators and guidelines) are based on the evaluation team's interpretation of the MSC criteria, as applied to the particular case of US pollock in the North Pacific. The standards set may not be identical to those used for other MSC certified fisheries, although the types of indicators considered are very similar. The MSC has made it clear that each fishery should be judged according to its particular circumstances and requirements, in line with the principles and criteria that they have set. In particular the standards used to judge this fishery may not be identical to those used to judge similar fisheries elsewhere, but reflect the particular ecological or other circumstances of the fishery. One consideration that has played an important part in the development of the indicators is the important role Pollock plays as a food source for many species in the Gulf of Alaska ecosystem, including many protected and endangered species. The standards for MSC certification may also not correspond exactly to the standards required by the fishery management plan or by the national legislation under which it operates.

In assessing the performance of the fishery against the standards, the evaluation team has had access to a voluminous set of information about all aspects of the fishery. Much of this information has been in the form of previous reviews of the fishery or particular aspects of it – indeed the US Pollock fisheries must be among the most reviewed fisheries in the world. In addition to a mountain of information on the public record, the evaluation team also had access to three major written submissions on the performance of the fishery with regard to the MSC principles and criteria, and in one case with respect to the specific scoring guidelines developed by the team. These included:

1. A detailed response to all the scoring indicators by the principal applicant for certification, At-Sea Processors Association (APA, 2002).
2. A review of issues to be considered by the evaluation team, developed by a team put together by the World Wide Fund for Nature (Bernstein et al., 2002).
3. A detailed submission by the Alaska Oceans Network raising a variety of issues of concern about the Pollock fisheries (Marz and Stump, 2002).

Very briefly, the position taken by, or the issues raised in each of these submissions can be summarized as follows:

<u>APA (2002)</u>

APA responded in detail to each of the scoring indicators, with a well-documented argument in support of their proposed score in each case. For the GOA fishery for MSC Principle 1, their proposed scores across all indicators were in the range 80-100 (i.e. they claimed that all standards were met by the fishery). Although performance for each indicator was evaluated in detail, overall their arguments were based on the following features of the assessment and management of GOA Pollock:

- A sound basis in research and monitoring for assessing the status of the Pollock resources in the GOA.
- The strength and quality of the stock assessments undertaken for Pollock in the GOA.
- The precautionary nature of the harvest control rules used to assign ABCs.

Bernstein et al. (2002)

The WWF submission was provided prior to evaluation of the fishery. The purpose of the submission was to provide the evaluation team with relevant information about the Alaskan Pollock fisheries, and to highlight ten specific issues that the authors of the submission felt the evaluation team should consider in assessing the fisheries for MSC certification. With regard to Principle 1, these issues included:

- Improvements to predicting the probability of overfishing under current harvest control rules.
- Improvements to the at-sea observer program in several areas.
- Uncertainty about environmental influences on stocks, and difficulty in clearly distinguishing the effects of natural and anthropogenic factors on stock dynamics and ecosystems.
- Improvements to some aspects of by-catch reporting.

The WWF submission did not specifically address the performance of the fisheries against the scoring indicators developed by the evaluation team.

Marz and Stump (2002)

AON provided a detailed and well-documented submission arguing that the Alaskan Pollock fisheries fail to meet the standards required for each of the MSC principles. General issues raised for Principle 1 included:

- Reliance on a few strong year classes of Pollock in setting ABC and TAC levels.
- Failure to consider some important uncertainties in stock assessments in setting ABC and TAC levels.
- Failure to address the needs of Pollock predators in setting ABC and TAC levels.
- Large uncertainties about stock structure and stock rebuilding.
- A pattern of serial depletion in regional Pollock stocks.
- Spatial and temporal compression of the Pollock fisheries.
- Failure to define overfishing in an ecosystem context.

The AON submission did not specifically address the performance of the fisheries against the scoring indicators developed by the evaluation team.

Other sources of information

As indicated above, there is an enormous amount of information about the Alaskan Pollock fisheries on the public record, and in the scientific literature. Key documents in assessing performance against scoring indicators for Principle 1 included:

- The annual SAFE reports for the GOA Pollock fishery (e.g. Dorn et al (2002)). These report on research, monitoring and status of stocks against NMFS national standards guidelines, and provide advice to NPFMC on ABCs for each stock management unit.
- The Draft Programmatic Supplemental Environmental Impact Statement (DPSEIS) prepared by the National Marine Fisheries Service (NMFS, 2001) to meet the requirements of the US National Environmental Policy Act (NEPA) requirements. This report includes detailed descriptions of the research, monitoring, assessment and management of Alaskan groundfish resources, including Pollock, including evaluation of ecological, environmental and socio-economic impacts of the fisheries.
- A recent scientific review of the harvest strategies currently used by NPFMC for managing groundfish fisheries (Goodman et al., 2002). While not focusing specifically on Pollock fisheries, this review provides a clear description of the current NPFMC harvest strategies and the tier system, and an evaluation of these strategies from a single species and an ecosystem point of view. While in general endorsing the current approach, the review points to the need to further test the robustness of the current harvest strategies to a range of uncertainties including environmental variability and stock structure.

In addition to the written reports listed above and in preceding sections, the evaluation team benefited greatly from direct discussions with a wide range of stakeholders about many aspects of the fishery and its impacts. In particular, staff at the Alaska Fisheries Science Center (AFSC) were very helpful in answering questions and clarifying technical issues about the research, monitoring and assessment of these fisheries. Ken Stump, a consultant to AON with a long-term involvement as a stakeholder in the Pollock fishery, also provided a lot of helpful information to the evaluation team from a non-Government perspective.

Summary of findings

The detailed findings of the evaluation team are reported below where the individual scoring indicators are considered. This section of the introduction provides a brief summary of the findings, grouped by five topic areas relevant to Principle 1 considerations.

Science

The biology, ecology and dynamics of walleye Pollock have been the subject of intensive research over almost three decades. The science (much of it undertaken by staff at the Alaska Fisheries Science Center) is in general world class. This is one of the best studied fish in the world, and much is known of its life history and dynamics. Key areas of remaining uncertainty from a single species stock management point of view, despite considerable effort expended in scientific research in these areas, include the relative influence of natural environmental variation versus fishing on the populations.

Monitoring

Monitoring of Gulf of Alaska Pollock stocks and fisheries also meets high standards. There are several time series of fisheries independent abundance indices, and surveys are well designed and conducted, although several are multi-species surveys that are not optimized for assessing pollock. Observer coverage is 30% on larger vessels, although observer presence is not random across fishing trips, and there is no at-sea observer coverage on vessels less than 60 feet in length. Sampling of age, length and other biological data is well designed and sample sizes are generally adequate.

Stock assessment

The quantitative assessment undertaken for GOA Pollock is also world class for a single species assessment. There is proper treatment of both observation and process uncertainty (statistical uncertainty), and the sensitivity of the assessment to a range of uncertainties (data selection and weighting, values of assumed parameters) is routinely undertaken. However the reporting of uncertainty in the assessments could be improved, and there is considerable uncertainty about the relative effects of fishing and environmental factors. This latter point emerges as a major issue in the evaluation of the fishery.

Status of resources

Pollock stocks show considerable fluctuations in abundance due to naturally high variability in recruitment. Longer term cycles in abundance seem to be driven by longer term changes in productivity of the Gulf of Alaska ecosystem, for which there is evidence of "regime shifts" – see review and references under Principle 2 report. Whatever the causes may be, the recruitment levels in the GOA were low in the 1960s, high in the 1970s, and have been generally low since then, with the fishery being sustained by occasional strong year classes. In absolute terms, the GOA stock is currently at the lowest levels of spawning biomass since the early 1970s, and has been in nearly continuous decline since the mid 1980s. The stock is currently well below target reference points agreed in the FMP. This is of considerable concern, both from a stock management point of view, and also because of pollock's important role in the Gulf of Alaska food chain. The relative role of environmental factors and of fishing in the decline of the stock is discussed in the detailed report on the scoring guidelines (see especially indicator 1.1.2.1).

Harvest strategies

As noted above, the GOA Pollock stock is managed under tier 3 of the NPFMC harvest strategies for groundfish. The tier 3 harvest control rule involves a maximum exploitation rate at high stock size, and progressively reduced exploitation rates below target stock levels, reducing to zero at 2% of unfished levels. In recent years, this harvest control rule has been modified to implement a fishery closure if the stock falls below 20% of average unexploited levels (due to concerns about impacts of reduced prey levels on Steller sea lions). It is not clear if this is meant to be a permanent change to the harvest control rule for this stock.

Apart from the overall ABCs and TACs, there is a complex set of regulations which attempts to spread the catches in time and space. These regulations have been developed for a variety of reasons. The spatial allocation of Pollock TAC meets socio-economic objectives by apportioning harvests between a number of fishing-dependent communities. They are also used as a management tool to prevent disproportionate harvest on local spawning stocks. Some of these regulations have also flowed from concerns about (local) impacts of reduced Pollock abundance on recovery of Steller sea lions. The spatial regulations limit the taking of Pollock close to sea lion colonies and haul outs. There is evidence for concentration of fishing and catches close to these exclusion areas in recent years.

Despite many good features of the harvest strategies applied under the NPFMC tier system, there are also some weaknesses as applied to management of GOA Pollock. Perhaps the main concern is uncertainty about the robustness of the strategies when some of the assumptions of the assessment models are not met. The key uncertainty for GOA Pollock concerns the relative impacts of the fishery and the natural environment on stock abundance, and arises from large natural fluctuations in stock size, including decadal or longer scale changes in productivity of stocks due to “regime shifts”. This issue interacts with concerns about the impacts of harvesting Pollock on populations of Pollock predators. There has been no systematic attempt to explore the robustness of current harvest strategies to these issues or uncertainties. The condition required for scoring indicator 1.1.1.5 is designed to address this issue.

Key issues for certification

Where the summary of findings for a scoring indicator shows that it does not meet the 80 pass mark, this in turn requires conditions to be stipulated either prior to or during certification. These conditions provide for bringing individual indicators to a passing score within a reasonable time frame (see Section 7 for a full description of this process). The detailed conditions for indicators where the scores are below 80 are spelled out in the following pages of this chapter.

MSC Criterion 1

The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.

Our interpretation of MSC Criterion 1: We focus on 1) management of the target species and 2) management of by-product species (retained commercial species that are not the prime target of the fishery). Other aspects of “associated ecological community” are generally dealt with under Principle 2, although some account is taken at the 100% scoring level of whether, for example, biological reference points also take account of broader ecological considerations. However the approach attempts to maintain reasonable consistency with previous certifications under MSC.

Subcriterion 1.1 - There is a well-defined and effective strategy for managing exploitation of the target species.

SSC 1.1.1: There is an adaptive and precautionary harvest strategy to manage the target stocks, including rules for setting catch limits.

The intention of this sub-criterion is to evaluate whether the “harvest strategy” used to regulate catches of the target species is likely to result over time in a well-managed stock (“maintaining the high productivity of the target population(s)”). The harvest strategy for pollock includes a “harvest control rule” (for determining acceptable biological catches or ABCs), which uses information from a stock assessment, which is in turn based on knowledge and data about the stocks and the fishery. The scoring indicators 1.1.1.1 to 1.1.1.6 evaluate various aspects of the harvest strategy, including the extent to which it is precautionary (resulting in more conservative regulations where uncertainty is higher) and robust to uncertainties in data and assumptions. These indicators need to be considered together in assessing the overall performance of the harvest strategy.

Indicator 1.1.1.1: The harvest control rule is well defined.

100 Scoring Guidepost

- The harvest control rule specifies very precisely the way in which ABCs are calculated.

80 Scoring Guidepost

- The harvest control rule specifies in general how ABCs are calculated, but there is latitude for variation and interpretation.

60 Scoring Guidepost

- The way in which ABCs are determined is ill-defined and varies considerably from year to year.

SCORE: 95

GOA Pollock stocks are managed under the North Pacific Fishery Management Council’s Gulf of Alaska Groundfish Fishery Management Plan. There is a well-defined set of harvest strategies in place under this plan to regulate catches of all groundfish resources. This is referred to as the Tier System, and is well described in a number of reports and public documents (National Marine Fisheries Service, 2001; Witherell et al., 2000). The system involves explicit definitions for an overfishing level (OFL), but does not include an explicit minimum stock size threshold (MSST). The reasons for not including an explicit MSST, and its possible consequences, are discussed in detail in Goodman et al (2002). The OFL is generally set at a level corresponding to F_{MSY}, the fishing mortality rate associated with (single species) maximum sustainable yield. Allowable biological catches (ABCs) are set to be below the OFL levels. The Tier system is structured such that stocks with the most information are managed at Level 1, while those with the least information are managed at Level 6. The system has been recently reviewed by Goodman et al. (2002).

The GOA Pollock stock is managed under Tier 3 of this system, the information requirements of which are reliable point estimates of biomass B, $B_{40\%}$, $F_{35\%}$ and $F_{40\%}$. The Tier 3 rule then specifies the fishing mortality rates for OFL and for ABC determinations, for a range of stock levels, as follows:

Stock status: $B/B_{40\%} > 1$

$F_{OFL} = F_{35\%}$

$F_{ABC} <= F_{40\%}$

Stock status $0.05 < B/B_{40\%} < 1$

$F_{OFL} = F_{35\%} \text{ x } (B/B_{40\%} - 0.05) / (1 - 0.05)$

$F_{ABC} <= F_{40\%} \text{ x } (B/B_{40\%} - 0.05) / (1 - 0.05)$

Stock status: $B/B_{40\%} < 0.05$

$F_{OFL} = 0$

$F_{ABC} = 0$

The F_{ABC} level is applied to the current estimate of biomass to determine the ABC. For the GOA stock, the biomass estimate is derived from the most recent stock assessment. Note that the ABC must be less than or equal to the amount specified in the formula, and is always less than the OFL. The Plan Team for the fishery recommends an ABC level, which is evaluated by the SSC (see Principle 3). The NPFMC determines the TAC (total allowable catch) for the next season based on this advice, and other considerations. The TAC is in almost all circumstances set less than or equal to the ABC.

Modifications have been made to the rule for setting the ABC for GOA Pollock in recent years. The ABC is set to zero if the stock size falls below $B_{20\%}$, or 20% of average unfished biomass. This change was brought in due to concerns about the impacts of depletion of Pollock on Steller sea lions. This change does not represent a permanent change to the Tier rule, but does introduce a proxy MSST to management of this stock.

In relation to scoring indicator 1.1.1.1 (a clearly defined harvest control rule), the strengths of this Tier system are clear. The score is set at slightly less than 100 due to some year to year changes in the application of the Tier rules (Goodman et al (2002) describe the detailed history of such changes) although recent changes have generally served to make the harvest control rule more precautionary. There is also potentially some latitude in selecting the appropriate Tier level for a stock, although in practice this has not changed in recent years for the GOA.

Indicator 1.1.1.2: The harvest control rule is based on appropriate limits to the maximum exploitation rate.

100 Scoring Guidepost

- Maximum exploitation rate is defined using precautionary reference points that take account of impacts on target and associated species.

80 Scoring Guidepost

- Maximum exploitation rate is defined using internationally recognized limit reference points for target species (such as F_{MSY} or its equivalent).

60 Scoring Guidepost

- F_{MSY} or its equivalent is used as a target rather than a limit reference point for exploitation rate.

SCORE: 85

As noted above, an overfishing limit is clearly defined at each tier level. The GOA stock is managed at tier 3, with $F_{35\%}$ set as the overfishing limit, and the target being $F_{40\%}$ which is well below the limit. The use of $F_{35\%}$ as a proxy for F_{MSY} as a limit to exploitation rate is consistent with current international best practice for single species harvest strategies (e.g. FAO, 1995). In reviewing the harvest strategies for groundfish in general (as opposed to Pollock in particular), Goodman et al (2002) note that:

> "The $F_{35\%}$ and $F_{40\%}$ proxies for MSY used in the groundfish FMPs are defensible, for this purpose, in that these values are supported by a body of scientific literature as being reasonable F_{MSY} proxies for "typical groundfish" species. However, the Council should be aware that harvests taken at these levels may be too high for species that have very low productivity and that are characterized by highly episodic recruitment."

As noted in the description for indicator 1.1.1.1 of the Tier 3 rule used for GOA pollock, maximum exploitation rates are reduced at lower stock sizes. This is not so much to protect associated species, as to speed recovery from low stock size. However the recent (2000) modification to the tier rule to close the fishery to directed Pollock fishing if the stock falls below 20% of unfished levels was introduced in response to concerns about such low stock levels on one of their predators (Steller sea lions). In addition, there is an overall limit to the annual sum of TACs for fourteen groundfish species or species groups, designed in part with ecosystem considerations in mind (Witherell et al., 2000). This OY limit for the GOA is currently set at 800,000 metric tons, and has not served to constrain TAC levels for GOA Pollock in recent years. APA (2002) argue that other measures (such as area closures to protect Steller sea lions and the recent $B_{20\%}$ threshold) also take account of impacts on associated species, and that the fishery therefore meets the 100 scoring guidepost level for this indicator. However Marz and Stump (2002) argue that the implicit target level under the harvest strategy – $B_{40\%}$ – is too low for a species such as Pollock which is a major prey source for many species in the Bering Sea and Gulf of Alaska ecosystems. They point to the management of krill within the CCAMLR convention, where the target stock level is at $B_{75\%}$. Bernstein et al (2002) also point to concerns about the impacts of pollock harvests on associated species. This issue is discussed extensively in the preamble to the report on Principle 2, and elsewhere in that part of the report, and also in the report on indicator 1.1.2.1 for Principle 1, which discusses the natural variability in Pollock abundance in the GOA, and the potential role of Pollock in the ecosystem.

Based on the use of $F_{35\%}$ to define the OFL, the fishery clearly meets the 80 level for this scoring indicator. It scores somewhat higher than this level due to the recent introduction of an MSST at 20% of unfished levels to protect Steller sea lions, but not at the 100 scoring level as this consideration does not reduce maximum exploitation rates, as stated in the scoring guideline.

Indicator 1.1.1.3: The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes.

100 Scoring Guidepost

- Exploitation rate is set to zero if stocks are assessed to be below threshold minimum stock sizes.
- The threshold minimum stock size is selected to take account of ecological as well as target species impacts.

80 Scoring Guidepost

- Exploitation rate is reduced as stocks decline below threshold levels, sufficient to promote rapid stock recovery.
- Threshold levels are selected in relation to internationally recognized limit reference points for target species (such as B_{MSY}).

60 scoring guideline

- Exploitation rate is not reduced as stock levels decline.

SCORE: 85

As noted in the description of the Tier system under scoring indicator 1.1.1.1, the harvest control rule for tier 3 involves reductions in exploitation rates as stocks fall below threshold levels (with thresholds set at levels approximating or slightly above B_{MSY}). Until recently, the level 3 tier rules have specified that zero ABCs would be called for only if stocks fell to 2% of unfished levels. However there was a recent decision to adopt a zero ABC threshold (an MSST) at 20% of unfished spawning stock levels, in recognition of concerns about impacts on the endangered western stock of Steller sea lions. According to this last point the fishery appears to meet the 100 scoring guidepost. However the fishery has been scored lower than this for two reasons. First, it is not clear that the MSST chosen is adequate to protect key predators such as Steller sea lions. Second, it has not been established that the reductions in exploitation rate below B_{MSY} but above the MSST are "sufficient to promote rapid stock recovery". Goodman et al (2002) also question this point. The condition set for indicator 1.1.1.5 will address this issue (along with a number of others).

Indicator 1.1.1.4: The harvest control rule results in reductions in ABCs as uncertainty increases.

100 Scoring Guidepost

- The harvest control rule includes provision for more conservative regulations as uncertainties about the status of the target species increase.
- The harvest control rule (or associated regulations) takes account of uncertainties about impacts on associated species.

80 Scoring Guidepost

- The harvest control rule includes provision for more conservative regulations as uncertainties about the status of the target species increase.

60 Scoring Guidepost

- The harvest control rule takes limited account of uncertainties in stock status.

SCORE: 85

In general, the tier system should result in more conservative ABCs for successively higher tier levels (1 → 6) since higher tier levels correspond to less information about a stock. This is generally the case for maximum exploitation rate (Goodman et al, 2002), but there are circumstances for which it is not true (e.g. there is a reduction in exploitation rate at low stock size for tiers 1 to 3, but not for tiers 4 to 6). There are also documented instances where a level 3 ABC would exceed a level 1 ABC for the same stock (Ianelli et al., 2002).

Apart from between tier precaution, it would be desirable if greater uncertainty resulted in lower ABCs within a tier as well. This is the case at levels 1, where the harmonic mean of pdf for F_{MSY} is used to determine the ABC, rather than the arithmetic mean (which is used to determine the OFL). The harmonic mean gets smaller as the spread of the pdf (the uncertainty) gets larger, so this method has the desired effect. The GOA stock is managed at tier 3 which uses point estimates of biomass and fishing mortality rates.

However the 2002 SAFE report for GOA Pollock does include several precautionary features that reduce the ABC due to uncertainties in the assessment. These include:

1. Fixing trawl catchability at 1 (rather than the model estimated value which is less than 1);
2. Assuming an average value for the 1999 year class, instead of the model estimated value which is much higher;
3. Not adjusting the Shelikof Strait survey biomass estimate, despite evidence that the fraction of the stock spawning in the survey area in 2002 was lower than normal;
4. Applying a more conservative harvest rate than the maximum permitted under the tier 3 harvest rule.

Point 3 should probably be discounted somewhat, as the action taken is the default assumption. Nevertheless, the overall impact is to reduce the ABC to less than 40% of the point estimate derived from the base case stock assessment model (Dorn et al, 2002).

In response to the draft report, Marz (2003) points to a number of areas in the monitoring and assessment of the fishery where it is claimed that uncertainties are not properly represented. These issues are properly addressed in other parts of this report (e.g. scoring indicators 1.1.2.3.2 and 1.1.2.3.3). Scoring indicator 1.1.1.4 is concerned with how (or whether) ABCs are reduced in the light of uncertainties, not with the level of those uncertainties. In this light, the fishery meets the 80 scoring level, and as already noted, goes part of the way to addressing the second point at the 100 scoring level.

Indicator 1.1.1.5: The harvest strategy can be shown to be precautionary.

100 Scoring Guidepost

- The harvest strategy or management procedure has been formally evaluated and demonstrated to be robust to known sources of uncertainty in data and model assumptions.

80 Scoring Guidepost

- The harvest strategy has been demonstrated to be precautionary, based on past management decisions and responses to uncertainty.

60 Scoring Guidepost

- While including some elements of precaution, the harvest strategy has not proved to be sufficiently precautionary.

SCORE: 75

The score for this indicator reflects an evaluation for the whole tier system as applied to pollock. Despite an analytical study to show that tier 1 is precautionary and tiers 1 to 3 ought to be precautionary (Thompson, 1997), that study was based on a relatively simple model of Pollock dynamics, which fails to account for some important complexities and uncertainties in stock dynamics (such as spatial structure in populations, and temporal changes in productivity due to regime shifts). Surprisingly, there has been no comprehensive simulation testing of the harvest strategies used for pollock management, nor attempts to test their robustness to a wide range of uncertainties and assumptions inherent in stock assessment and management (Goodman et al, 2002). Such methods are now widely used in developing and testing both generic and fishery-specific harvest strategies (Butterworth and Punt, 1999; Smith et al., 1999), and have even been proposed, and are starting to be implemented, to test broader ecosystem based management strategies (Sainsbury et al., 2000). Hilborn and Walters (1992) have argued that all harvest strategies should be tested in this way. The methods involved (management strategy evaluation or evaluation of management procedures) are well known and documented. Goodman et al (2002) recommend adoption of this approach to test the robustness of the NPFMC harvest strategies in general.

The 80 scoring guidepost for this indicator is not met. The harvest strategy has not been demonstrated to be precautionary because the stock has been in nearly continuous decline for over fifteen years. It is noted elsewhere in this report that a substantial part of that decline may be attributable to environmental conditions, and as there are a number of precautionary features of the harvest strategy, the score does not fall below the 60 level. However the current harvest strategy has not been shown to be robust to environmentally driven changes in productivity (or to several other sources of uncertainty identified later in this report). The following condition is therefore set to bring the score for this indicator to at least the 80 level.

Condition

To improve the deficiencies in performance for this indicator, SCS requires that formal evaluation and testing of the robustness of current and any proposed new harvest strategies used to manage GOA pollock be undertaken, using methods similar to those recommended by Goodman et al. (2002). The SCS evaluation team requires that any plans to correct this deficiency lay out a step-wise plan with timelines such that at least three stages of work would be available for evaluation:

1. Prepare detailed specifications for the evaluation.
2. Undertake the evaluations.
3. Modify harvest strategies as appropriate from the results of the evaluations.

Notes related to tasks:

Designing and implementing a management strategy evaluation study is a complex task, and the SCS evaluation team does not seek to prescribe precisely how it should be done. Nevertheless, the SCS team sees this condition as the key one that will help overcome most of their concerns with regard to Principle 1, and wishes to maintain an active involvement in monitoring progress in meeting the condition. The SCS team also considers it prudent that there be suitable opportunity for input from key stakeholders in the fishery. (Where there is substantial disagreement between stakeholders, the SCS team will be the final arbiters).

Whoever is contracted to undertake the task would do well to consult and be guided by the fairly detailed proposal in sections 3.10 and 3.11 of Goodman et al (2002) as this will be used by the SCS team as a benchmark, noting that those specifications are for testing generic NPFMC harvest strategies, and will need to be adapted for the specific circumstances of GOA Pollock.

In general, task 1 will involve specifying the set of performance measures against which the harvest strategies will be judged, the set of robustness tests to be undertaken, the detailed specifications of the operating models to be used, and the range of harvest strategies to be evaluated. The latter should include monitoring and assessment models as well as harvest control laws, noting that some simplification of detailed assessment models may be required for computational efficiency in testing harvest strategies. The robustness tests should include, at a minimum, the impacts of environmentally driven changes in productivity and the impacts of episodic recruitment. They should deal explicitly with key issues and uncertainties identified elsewhere in this report and cross referenced to this condition. Consideration should be given to including operating models that go beyond single species dynamics, where these are available or can be developed in suitable timeframes, and performance measures should include consideration of impacts on predators. The detailed specifications and proposal for work should be presented and discussed at an open workshop as soon as practical following certification. The proposal should specify who will undertake the work, the timelines involved, and the resources allocated to the task. At least one member of the evaluation team should attend the workshop.

The work program is to be agreed by the SCS evaluation team and the group undertaking the evaluations. The timelines can not be pre-specified, but will depend on the nature and complexity of the agreed work program. To maintain certification, progress on agreed tasks will be checked during surveillance visits at the specified time frames, or at the annual audits required by MSC if the time frames coincide.

The results of the evaluations will be made available to NPFMC, and will be presented at a second open workshop. Appropriate responses to the evaluations, including suggested changes to current harvest strategies, will be discussed and agreed in principle. Uptake of changes will follow through the due process of NPFMC decision making.

Indicator 1.1.1.6: The harvest strategy is properly applied.

100 Scoring Guidepost

- The agreed harvest strategy is applied without exception.

80 Scoring Guidepost

- Decisions about catch limits follow the agreed strategy.

60 Scoring Guidepost

- The harvest strategy is not applied consistently, or is regularly over-ridden in ways that result in less precautionary outcomes.

SCORE: 95

The NPFMC almost always agrees to the recommendations of the SSC, which in turn adheres to the rules laid out in the tier system (Witherall et al, 2000; APA, 2002). As already noted, there have been fairly regular changes to the details of the harvest strategies over the years. Individual changes are subject to evaluation under NEPA legislation and have generally (though not always) resulted in more precautionary strategies being adopted. The whole FMP, including the tier harvest control rules, is in the process of comprehensive evaluation under a programmatic EIS under NEPA.

Based on documentary evidence provided and discussions with a wide set of stakeholders, it is evident that the tier rules and their agreed modifications are applied almost without exception in formulating ABCs and setting TACs in the GOA, and this indicator nearly meets the 100 level score.

SSC 1.1.2: Stocks are not depleted and harvest rates are sustainable.

In contrast to SSC 1.1.1, which evaluates generic properties of the harvest strategy, SSC 1.1.2 evaluates the current status of the target species or stocks, and the basis for being reasonably certain about their status. The Scoring Guideposts are arranged hierarchically, so that evaluation of the current status depends on the assessment, which in turn depends on data and knowledge about the stocks and the fishery.

Indicator 1.1.2.1: Current stock sizes are assessed to be above appropriate limit reference points.

The intent is to assess whether the stock is currently "overfished". There is no internationally agreed standard to define this. A recent FAO view is that target stocks should generally be maintained above B_{MSY}, which should be used as a limit reference point. An alternative (but not generally accepted) view is that explicit allowance should be made for predators by increasing target and limit levels well above B_{MSY} (e.g. the "CCAMLR" strategy). Stock levels can also fluctuate due to natural environmental variability, and this needs to be taken into account. In this regard, B_{MSY} is an equilibrium concept and is not easily defined for a naturally fluctuating stock. In the absence of precise or agreed definitions or standards, expert judgments will be made based on the following guideposts.

100 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 90% probability.
- The reference biomass is above B_{MSY} and takes into account the needs of predators.

80 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 70% probability.
- The reference biomass is B_{MSY} or its equivalent and takes into account the natural variability of the stock.

60 Scoring Guidepost

- Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent.

Operational interpretation of the scoring guideposts

For the reasons outlined in detail in the report below, it is possible to interpret the reference biomass (B_{MSY}) in both a static and a dynamic sense. In scoring the fishery against this indicator, the 60 scoring guidepost is interpreted as requiring that the stock remain both above the dynamic interpretation of B_{MSY}, and above the static interpretation of $B_{20\%}$. For the 80 and 100 scoring guideposts, the static interpretation of B_{MSY} is the only interpretation required.

SCORE: 70

This scoring indicator was the subject of considerable debate during the course of the SCS evaluation process. The main point of contention was the choice in the scoring guideposts of B_{MSY} as a limit reference point, since it is used more as a target reference point in the NPFMC tier system, with half B_{MSY} being regarded as the limit reference point in the US National Standard Guidelines (MSST – see discussion for indicator 1.1.1.1). It was also argued by some staff at AFSC, by other staff in NMFS (Dr Pamela Mace), and by Dr Rick Deriso of the IATTC, that B_{MSY} is in fact not an agreed limit reference point for the FAO or an internationally agreed limit reference point, as stated in the "intent" section of this scoring indicator. While it is agreed that this latter point is substantially correct, this does not in fact seem entirely consistent with the general agreement, including in the NPFMC harvest strategies, that F_{MSY} is a limit reference point for fishing mortality (it is hard to see how B_{MSY} can be a target if F_{MSY} is a limit). The SCS team also noted that there are references in the international literature to B_{MSY} as a limit reference point (e.g. Jennings et al., 2001).

Notwithstanding the academic debate, the intent in choosing B_{MSY} as a limit reference point for Pollock was to ensure that a fishery for a species such as Pollock, which appears to be a key prey species in its ecosystem, should maintain the stocks at levels that would not jeopardize the productivity of key predator species (such as Steller sea lions). The issue of course is that there is no general agreement on what such levels should be (see detailed discussion of this issue in the preamble to the report on Principle 2).

Another complication in scoring this indicator is that, especially for a naturally fluctuating population, B_{MSY} is not a fixed entity, nor indeed is $B_{100\%}$ (unfished population level) nor any fraction of this (such as $B_{X\%}$). It has already been noted, and is discussed in detail under Principle 2, that the Gulf of Alaska appears to be subject to decadal or longer time scale shifts in productivity ("regime shifts"), and that Pollock productivity and abundance is influenced by such changes. Stakeholders point to several concerns with regard to using B_{MSY}. Bernstein et al (2002) point to the importance of trying to distinguish and account for the relative impacts of fishing and environmental influences on abundance, and Marz and Stump (2002) point to the problem of the "shifting baseline" in calculating B_{MSY} in practice.

For GOA Pollock, the issue of changes in productivity and non-stationarity in parameters such as B_{MSY}, needs to be addressed explicitly. Pollock recruitment is highly variable, and pollock dynamics, especially in the GOA, is driven by the frequency of strong year classes (see Dorn et al, 2002, Figure 21). Pollock recruitment was low in the 1960s, high in the late 1970s and early 1980s, and has been episodic but generally since then. As noted below, these changes in recruitment appear to be unrelated to levels of spawning stock, and result in very large changes in stock size even in the absence of fishing. (Recent CIE reviews of the fishery by Godo (2003) and Haddon (2003) also emphasize this feature). As noted above, B_{MSY} is inherently an equilibrium concept, and as far as pollock is concerned, the GOA is not an equilibrium system. All this implies that evaluation of the fishery against this scoring indicator is not straightforward.

The 2002 assessment for the GOA stock (Dorn et al, 2002) shows the population to be at 28% of unfished spawning biomass, or at 24% if the risk averse assumption is made that the 1999 year class is of only average abundance (the assessment suggests it is stronger, but uncertainty in the estimate of year class strength is high as it is not fully recruited to the fishery as yet). Both these levels (28% and 24%) are well below the B_{MSY} proxy of $B_{35\%}$, which is based in turn on average recruitment levels over the period from 1979 to 1999. On this analysis, the GOA stock would fail this scoring indicator (score less than 60). (The corresponding levels for the 2003 assessment are 31% and 27% of unfished levels (Dorn et al, 2003), still below the reference level, though indicating a partial recovery in the stock levels).

Noting the scientific evidence for regime shifts in the GOA, and also that there does not appear to be any relationship between spawning stock levels and subsequent recruitment for this stock (Dorn et al, 2002), the SCS evaluation team requested some further analyses from Martin Dorn (AFSC, Seattle – leader of the assessment team for GOA pollock), using the existing base case assessment model, to calculate the following:

1. Projections for stock size (3+ biomass and female spawning biomass) in the absence of fishing. These would be based on the assumption that the same recruitments would have occurred in the absence of fishing as have occurred with fishing taking place. These provide an alternative baseline time series for "unfished biomass".
2. A time series of relative depletion estimates for the GOA stock (biomass in a given year divided by unfished biomass in the same year, as calculated in 1 above).
3. A time series of exploitation rates for the GOA stock (catch divided by 3+ biomass).

Because of its importance to consideration of an appropriate evaluation against this scoring indicator, Martin Dorn's response to this request is included as Appendix 3 to this report. In brief, and allowing for the assumption that unfished biomass can be calculated in the manner suggested, the key results are as follows:

1. Stock size for GOA pollock would have varied almost tenfold since 1960, even in the absence of fishing (Figure 1, Appendix 3).
2. The declining trend in abundance since the early 1980s (Dorn et al, 2002) is also evident for the unfished stock (Figure 1, Appendix 3).
3. The lowest relative depletion level in the time series is 59% of the corresponding unfished level for 3+ biomass, and 44% of the unfished level for female spawning biomass (Table 1 and Figure 4, Appendix 3). Both are well above the $B_{35\%}$ proxy for B_{MSY}.
4. Exploitation rates for GOA Pollock have generally been low, although there is an overall increasing trend to the time series (Figure 3, Appendix 3), and a tendency to higher exploitation rates at lower stock sizes.

It is also interesting to note that the exploitation rate for GOA Pollock has been less than the exploitation rate for EBS (Eastern Bering Sea) Pollock in most years, although the latter is generally regarded as being in a healthier state, being at much higher stock size relative to average unfished levels (Ianelli et al, 2002). (However the comparison needs to be viewed with caution. The assumption of no relationship between spawning stock size and subsequent year class strength does not appear to hold as well for the EBS stock as it does for the GOA stock). Nevertheless, the poor status of GOA Pollock seems to be due to a long period of generally poor recruitment, rather than to exploitation rates having been too high.

Before discussing the relevance of these results to this scoring indicator, it is worth discussing the key assumption that recruitment would have been the same for an unexploited stock. Of course this is an assumption that can never be tested. However for GOA Pollock, it seems as though it may be a not unreasonable assumption, given the lack of a clear relationship between spawning stock size and subsequent recruitment (Dorn et al, 2002). Martin Dorn discusses this point in Appendix 3:

> "The depletion estimate obtained by taking the ratio of the model estimate of current biomass to virtual unfished biomass implicitly takes into account environmental trends that affect stock productivity. Both the conventional estimate of depletion and this new estimator do not take into account the indirect impacts of fishing due to changes in stock biomass (fewer recruits at low stock size, more cannibalism at high stock size). For example, the decline in mean recruitment in the 1980s and 1990s could be argued to be the result of lower spawning biomass, not environmental change. This line of argument is countered by noting that low stock sizes in the 1970s produced strong year classes, and that there isn't a clear pattern of declining recruitment in a plot of recruitment against spawning biomass. Many fisheries debates revolve around the relative importance of fishing versus the environment. Perhaps a stronger case can be made for the environment in this instance because harvest rates for GOA pollock have been demonstrably conservative for a gadid (Fig. 3)."

Allowing that much of the decline in the GOA stock over the past 20 years is environmentally driven puts a different emphasis on the exploitation history and current status of this stock. The results in Appendix 3 suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level relative to where it would have been now if the stock had never been fished is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these levels are well above the proxy $B_{35\%}$ level for B_{MSY} if the latter is viewed as a potentially dynamic quantity. If environmental variability is ignored and B_{MSY} is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below B_{MSY}, and the stock is overfished based on the standard suggested for this scoring indicator.

Dorn et al (2003) have updated the analysis described in Appendix 3 to include consideration of the impacts of spawning stock size on recruitment, as well as the (unknown) environmental drivers. Depending on the form assumed for the stock recruitment relationship, the estimates of spawning stock depletion in 2002 range between 40% and 46% of unfished levels. They conclude that "These results suggest that environmental variability is the most likely explanation for current low levels of stock abundance".

Which of these two views of stock status (relative to static or dynamic estimates of B_{MSY}) should the SCS evaluation team use to judge performance against this indicator? Neither is "correct" - they just represent different ways of viewing stock status. In considering this question, the evaluation team went back to their original rationale for choosing this indicator and selecting the reference level chosen (B_{MSY} bearing in mind that its proxy for pollock is $B_{35\%}$). The rationale stemmed in large part from concerns about the ecological impacts of low stock levels on predators of Pollock. The "intent" description for this scoring indicator refers both to this issue, and also to a need to take into account the effects of environmental variability. How might these two issues be reconciled?

There is strong evidence that the GOA ecosystem is highly variable and that this in turn impacts on population levels of individual species, and may also affect community structure (see discussion in preamble to Principle 2). The results in Appendix 3 and in Dorn et al (2003) suggest that this variability is an important feature of the dynamics of Pollock in the GOA, with population levels potentially fluctuating tenfold even in the absence of fishing. Although the system has only been observed through one of these cycles, it seems reasonable to suppose that such variability is a natural feature of this ecosystem. If so, then predators of species such as Pollock must also have had to cope with such variability in the past. They may well be adapted to such variability, and have a variety of mechanisms (such as prey switching) to deal with it. The results in Appendix 3 (Figure 1) suggest that fishing has served to accentuate rather than fundamentally change the nature of that variability. That in itself may be of concern – with a constant exploitation rate, the low points in the cycle would be lower with fishing than without it. On the other hand, the fact that stock level falls below an average $B_{35\%}$ level may not be of substantial concern, if such events are commonplace even in the absence of fishing. However it seems reasonable to suppose that there ought to be a "bottom line", a level below which it is undesirable for the stock to fall on the grounds of ecological impacts on the ecosystem, and hence below which exploitation should cease. Under the current GOA harvest strategy for Pollock, that level is 20% of average unfished levels. Given the apparent level of natural variability in the stock, and the calculation that, even with a maximum exploitation rate of $F_{75\%}$ (i.e. a target stock size of $B_{75\%}$) the stock would still fall below $B_{35\%}$ almost 20% of the time (Martin Dorn, unpublished data), a 20% bottom line seems not unreasonable.

Based on all the complex arguments presented above, the SCS evaluation team concludes that the fishery fails to achieve a passing 80 score for this indicator, due to the current low level of absolute abundance and its possible wider ecological impacts (especially for predators). However the evaluation team takes note of the possibility that much of the decline in abundance may be due to environmental factors, and that the stock appears in general to have been responsibly managed as far as exploitation rates are concerned. The team is therefore of the view that the score for this indicator does not fall below the 60 scoring level.

Two responses to the evaluation of this indicator in the draft evaluation report are worth recording here. Marz (2003) states:

> "We strongly disagree with the team's analysis under this PI. The GOA stock should fall below the 60 SG level because its abundance estimates are dangerously low and below MSY. Your analysis involves gross speculation. The issue is not whether variability is a natural feature of the ecosystem, but how much has fishing changed the nature of that variability. This is impossible to assess definitively. As such, it is imperative to manage the fisheries in as precautionary a manner as possible regardless of what has caused the low stock size. This involves lowering TAC levels, if fishing is permitted at all. However, the Council recently *increased* the harvest level 31 percent despite the fact the GOA pollock biomass is low and below MSY. Further, relying on the strength of the 1999 year class is dangerous as many of the assumptions in calculating the stock estimate may be overestimated. Given the low biomass estimate, it would be more precautionary to leave more of the 1999 year class in the water to mature and grow.
>
> As noted by Dayton et al. (2000), without reliable baseline data to compare the current state of the ecosystem to an unfished environment, the causes of ecosystem changes in a complex system can always be argued. Undoubtedly environmental forces play a large (though not well understood) role in determining the population dynamics of fish species, particularly on a year-to-year basis in a variable high-latitude marine environment, as do ecological interactions between species in the marine food web. But it must be said that no theory of "regime shifts" has shown an effect on any fish population as profound as that which is *assumed* in the stock assessment models and theory of MSY, which approximately doubles the estimated annual mortality on stocks such as pollock, by design (Field 2002)."

In response to several of the points raised by Marz, it seems to the evaluation team that Dorn's analyses do in fact address (if not definitively, but that is never possible) the extent to which fishing has changed the nature and extent of the natural variability in abundance. The recommended increase in the TAC levels reflects a more optimistic assessment, and discounts (rather than relying on) the strength of the 1999 year class. The increase comes about from proper application of the existing harvest strategy. It has already been noted that this has not been demonstrated to be robust to the type of variability in productivity evident in GOA pollock, but the condition at indicator 1.1.1.5 is designed to address this issue directly (and result in a more conservative harvest strategy if the evaluations indicate that is called for).

Pope (2003), one of the external reviewers of the report, made the following comment with regard to this scoring indicator:

> "The assessment team clearly had problems with this indicator. Personally I would prefer it to refer to the limit reference point as specified by the tier rules rather than at an absolute level. Whether the tier rules (or for that matter B_{msy} based rules) are precautionary will be decided under the condition to 1.1.1.5. Similarly I would exclude predators' needs here but deal with them robustly in the appropriate place. This interpretation would lead to a passing score here. However, using the scoring guideposts as written I think the assessment team is correct to give no more than 70. Indeed the wording of 60 might suggest a still lower score but I think this might be unjust. The problem here underlines the difficulty of biomass limits with stocks subject to large natural fluctuations. The conditions specified seem reasonable."

Mindful of these views, and of the additional assessment reported in Dorn et al (2003), the SCS evaluation team stands by its original scoring for this indicator.

Condition

1. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation. Specifically, the testing of alternative harvest strategies should evaluate whether the criterion that the stock should remain above the static version of $B_{20\%}$ provides sufficient protection for predators of Pollock.
2. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the relative impacts of fishing on recruitment variability and stock abundance.
3. The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).

Indicator 1.1.2.2: Current exploitation rates are below appropriate limit reference points.

100 Scoring Guidepost

- Stock assessments show the current exploitation rate to be below the limit reference point with greater than 90% probability.
- The limit reference point is below F_{MSY} and takes account of needs of predators.

80 Scoring Guidepost

- Stock assessments show the current exploitation rate to be below the limit reference point with greater than 70% probability.
- The limit reference point is set at F_{MSY} or equivalent.

60 Scoring Guidepost

- Stock assessments show the current exploitation rate to be at or below F_{MSY} or its equivalent.

SCORE: 80

While it is of concern for GOA Pollock that exploitation rates have tended to rise as the stock has declined (Figure 3, Appendix 3), recent exploitation rates have been falling and are below the proxy for F_{MSY}. The submission by APA points out that the large increases in exploitation rates in 1997 and 1998 were the result of an agreed change to the tier system to conform to the 1996 amendments to the Magnuson-Stevens Act. They therefore claim that, while in retrospect this may have resulted in poor decisions given the continuing decline in the stock, this was the result of Council decisions for a carefully managed fishery, and not a symptom of a loosely managed fishery increasing its exploitation rate to maintain catches.

The SAFE reports do not explicitly calculate the probability that current exploitation rates are below limit reference points. However the following rough calculation based on published information in the 2003 SAFE report serves to address this question. These calculations use the results in Table 14 of Dorn et al (2003) for Model 2 (the base case model) assuming average (not the higher, estimated) 1999 recruitment. Table 14 provides the following information:

2004 3^+ biomass = 740,440 t (CV = 10%) (1)
OFL yield for 2004 = 91,060 t (2)
ABC yield for 2004 = 65,660 t (3)

Assuming a normal distribution and using result (1), there is only a 5% chance that the 2004 3= biomass is as low as 80% of 740,440 t or 592,352 t. Hence a "worst case" scenario is that

2004 3^+ biomass = 592,352 (4)

Using (1) and (2), the OFL harvest rate is 91,060/740,440 or 0.123. Using (1) and (3), the ABC harvest rate is 65.660/740,440 or 0.089. Using (3) and (4), the "worst case" harvest rate is 65,660/592,352 or 0.111, which is less than the OFL harvest rate of 0.123. Therefore, based on these calculations, there is considerably more than a 95% chance that the proposed ABC will result in a harvest rate that is below the OFL limit reference point.

The GOA fishery therefore meets the first point of the 100 scoring guidepost, and the second point of the 80 scoring guidepost.

SSSC 1.1.2.3: There is a robust assessment of the stocks.

Indicator 1.1.2.3.1: Assessment models are appropriate to the biology of the stock and the nature of the fishery.

100 Scoring Guidepost

- The assessment model is fully spatially structured, and takes account of all sources of mortality on the target species.
- Natural mortality is time and age specific and takes explicit account of predation mortality.

80 Scoring Guidepost

- The assessment model is state of the art for single species assessments, and takes account of spatial structure and of all likely sources of fishing mortality.
- Natural mortality can be age and time invariant, and subsumes predation mortality.

60 Scoring Guidepost

- The assessment model does not take proper account of spatial structure and only accounts for fishing mortality from landings from the principle fishery.

SCORE: 85

The assessment for the GOA stock (Dorn et al, 2002) uses state of the art methods for single species (integrated analysis) and is undertaken by scientists at AFSC with strong international reputations in stock assessment methods. The current assessments do not take explicit account of predation mortality, although previous work at AFSC has explored methods to do this (e.g. Hollowed et al, 2000). Spatial structuring within the GOA is reasonably well studied and understood (Bailey et al, 1999), but the current assessment models are not explicitly spatially structured. Nevertheless, there are several ways in which spatial structure is accounted for in the assessments. First, assessments are based on several types of surveys that cover major spawning areas for this stock, as well as substantial fractions of the non-spawning areas. Although Godo (2003) points to limitations in individual survey methods to assess pollock, the use of so many different methods (four since the 1980s) that cover different parts of the stock, and the use of most of these indices as relative rather than absolute measures of abundance, mitigates many of these concerns. Second, inter-annual changes in stock distributions are accounted for to some extent by allowing for year to year changes in selectivity both for the commercial fleet and for survey vessels. Natural mortality is assumed to be age and time independent, and to subsume predation mortality. (The latest stock assessment, released subsequent to the draft evaluation report, describes and applies a model that uses time and age specific natural mortality – Dorn et al (2003)). All likely sources of fishing mortality are accounted for (see indicator 1.1.2.3.5.1). Therefore the GOA fishery clearly meets the 80 scoring guidepost and has started to address some aspects of the second point at the 100 level (time and age specific natural mortality).

Indicator 1.1.2.3.2: Stock assessment methods are statistically rigorous.

100 Scoring Guidepost

- The assessment method has been simulation tested and the results show that major outputs of management interest meet reasonable levels of precision and accuracy.

80 Scoring Guidepost

- The assessment uses parameter estimation procedures that take account of observation and process uncertainty and are recognized to comply with standards of statistical analysis.

60 Scoring guideline

- Model estimation procedures take limited or inappropriate account of statistical uncertainty.

SCORE: 80

In general, the assessment methods for the GOA (Dorn et al, 2002) use sound statistical approaches to parameter estimation (Haddon, 2003). Process uncertainty includes estimation of annual year class strengths, and allowance for temporal variation in selectivity patterns of both commercial and survey fleets. Observation uncertainty is accounted for by developing variance assumptions and statistical error models for the following data sources: fishery catch, age and length composition; survey biomasses; and survey age and length compositions. However the evaluation team did note that the CVs used to weight the survey indices in the model tended to under-represent the uncertainties as judged by the fits of the model to the survey data (Figures 16-18 in Dorn et al (2002)). Some of the lack of fit (driven by the “noisiness” in the survey indices) may be explained by the issues raised in the review of the surveys by Godo (2003), including inter-annual changes in stock distributions (see scoring indicator 1.1.2.3.4.5). An NRC panel on stock assessment methods undertook simulation testing of the performance of similar methods, and found them to work as well as any of the methods that were tested (National Research Council, 1998), but there has been no direct testing of the methods used explicitly for pollock.

In commenting on this scoring indicator, Marz (2003) notes:

> "In other words, the pollock ABC was set at the midpoint of the probability distribution curve and therefore had a 50-50 chance of being "right." There is an equal risk of being "wrong" in the example above – i.e., overfishing, or fishing above the target ABC level."

Setting aside that this comment refers to the harvest strategy rather than to the statistical rigor of the assessment (and therefore seems more appropriate to the next scoring indicator), it in any case seems to miss the point. The ABC is intended as a target, and fishing in excess of the ABC does not in itself constitute overfishing, as stated in the comment above. The OFL is deliberately set to be well in excess of the ABC to account for the "50% chance of being wrong". Whether the harvest strategy is robust to such statistical uncertainties in the assessment will be evaluated in addressing the condition attached to indicator 1.1.1.5.

Based on the way that the assessment uses sound statistical procedures to take account of process and observation uncertainty, the GOA fishery meets the 80 scoring guidepost for this indicator. However the evaluation team recommends that consideration be given by the GOA Plan Team to increasing the survey CVs used in the assessments (above estimated levels that only reflect sampling variability) to better reflect "process uncertainty" in the surveys, and to better match the goodness of fit of the model to each of the survey time series.

Indicator 1.1.2.3.3: Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.

100 Scoring Guidepost

- There is a comprehensive evaluation of sensitivities to assumptions, parameters and data for key outputs of interest such as stock abundance.
- Uncertainty about key inputs to which assessments are sensitive is taken into account in the harvest strategy.

80 Scoring Guidepost

- There is a thorough evaluation of sensitivities to assumptions, parameters and data for key outputs of interest such as stock abundance.
- Uncertainty about key inputs to which assessments are sensitive is taken into account in the harvest strategy.

60 Scoring Guidepost

- Sensitivity analyses are limited or non-existent.
- Results of sensitivity analyses are not properly taken into account in the harvest strategy.

SCORE: 79

Sensitivities of the GOA assessment to model assumptions, parameters and data are undertaken and presented each year. For example, six alternative models were presented for consideration by the GOA plan team in 2002 (Dorn et al, 2002). These included sensitivity to estimating trawl survey catchability, to use of the 2002 Shelikof Strait survey results, and to use of other survey data. Different sensitivities (e.g. to parameter values such as natural mortality) had been estimated in previous assessments. To this extent the fishery appears to meet the first point in the 80 scoring guidepost. However Marz (2003), citing Godo (2003), points out that there are several key sensitivities that are not adequately tested in the assessment. For the surveys, this includes sensitivity to changes in spatial distribution (perhaps reflecting changes in the ecosystem). Godo (2003) also points to the possible impacts of regime shifts on the calculation of reference points and the estimation of stock recruitment relationships (in agreement with the points raised by the evaluation team in scoring indicator 1.1.2.1). The analysis presented in Appendix C of Dorn et al (2003) goes some way to addressing some of these concerns, as will the evaluations required in the condition attached to indicator 1.1.1.5.

Sensitivity tests are often undertaken in response to previous peer review comments by the Plan Team and the SSC. It is the role of the SCS to select the most appropriate model for application of the tier rules to determine the ABC. The tendency is to select the "best" model recommended by the Plan Team, but there is some evidence that they err on the side of caution. Also, the authors of the SAFE reports have themselves, in recent reports, recommended ABC levels based on models and assumptions (sensitivity tests) and proposed modifications to the Tier rules that also err on the side of caution. For example in the 2003 SAFE report, the ABC recommendations are based on several risk-averse assumptions: 1) fixing bottom trawl survey catchability at 1 (higher than the estimated value), which reduces estimates of stock abundance and therefore yield estimates; 2) assuming an average 1999 year class instead of the (higher) estimated value; and 3) applying a more conservative harvest rate than the maximum allowable F_{ABC}.

While the discussion above suggests that the fishery meets both the points at the 80 scoring level, the evaluation team is concerned that some aspects of the uncertainty are still not adequately accounted for in application of the tier rules. For example, as noted in the discussion for indicator 1.1.1.4, the "status determination" calculations to determine overfishing use the point estimates of biomass, despite the fact that Bayesian analyses for GOA pollock (Dorn et al, 2002, 2003; appendices) would seem to allow this stock to be managed at tier 1, which does take explicit account of uncertainties in setting ABCs. The tier level chosen is a decision for the SSC. While GOA pollock continues to be managed at tier 3, the evaluation team feels that the second point at the 80 scoring level for this indicator is not adequately met (uncertainties are not properly taken into account in the harvest strategy). This indicator is therefore scored just below the 80 level.

Condition

1. Consideration be given by the SSC to raising GOA pollock to Tier 1 so that the harvest strategy is more responsive to uncertainties in the assessment.
2. The Bayesian analyses already undertaken for GOA pollock be used to better present the uncertainties in the assessment, including confidence intervals on stock biomass

trajectories, and probabilities that biomasses and exploitation rates exceed target and limit reference points.

SSSSC 1.1.2.3.4: There is adequate knowledge about the target stocks.

The intent is to evaluate whether knowledge about the target species is sufficient to allow a reasonable expectation of a robust assessment of the status of stocks. Where knowledge is limited, this may be mitigated to some extent if the assessment or harvest strategy is robust to those sources of uncertainty. This is the sense in which the word “adequate” is used.

Indicator 1.1.2.3.4.1: There is knowledge of the identity of the target species

100 Scoring Guidepost

- There is a very high degree of confidence in proper identification and reporting of the target species. (Close to 100%)

80 Scoring Guidepost

- There is a high degree of confidence in proper identification and reporting of the target species. (Above 90%)

60 Scoring Guidepost

- There is only a moderate degree of confidence in proper identification and reporting of the target species. (Below 80%)

SCORE: 100

There is no likelihood of mis-identification of pollock. This indicator therefore meets the 100 scoring level.

Indicator 1.1.2.3.4.2 There is knowledge of the identity of stocks in the management area of the fishery.

100 Scoring Guidepost

- The identity and distribution of all genetically separate stocks is known.
- Genetically separate stocks are managed separately.

80 Scoring Guidepost

- The identity and distribution of major spawning sites are known.
- Management boundaries correspond reasonably well with stock boundaries.

- Management boundaries are adjusted as new information on stock boundaries becomes available.

60 Scoring Guidepost

- Stock structure is largely unknown.
- Uncertainty about correspondence between stocks and management units is ignored.

SCORE: 80

Stock structure and more generally spatial structure have been well studied in pollock, both within US waters and more generally in the North Pacific (Hinckley, 1987; Bailey et al 1999). Despite the amount of work, the results are not definitive with regard to clear stock boundaries, a situation which is common to many broadly distributed marine fishes. Given this uncertainty, the approach adopted by the NPFMC to selection of management units at he large (North Pacific) scale can be seen as broadly precautionary (a tendency to split rather than lump), and the management units correspond broadly to what is understood about spatial structuring of this species.

For the GOA, the most recent stock assessment (Dorn et al, 2003) states:

> "The results of studies of stock structure in the Gulf of Alaska are equivocal. There is evidence from allozyme frequency and mtDNA that spawning populations in the northern part of the Gulf of Alaska (Prince William Sound and Middleton Island) may be genetically distinct from the Shelikof Strait spawning population. However significant variation in allozyme frequency was found between Prince William Sound samples in 1997 and 1998, indicating a lack of stability in genetic structure for this spawning population. Olsen et al. (2002) suggest that interannual genetic variation may be due to variable reproductive success, adult philopatry, source-sink population structure, or utilization of the same spawning areas by genetically distinct stocks with different spawning timing. Peak spawning at the two major spawning areas in the Gulf of Alaska occurs at different times. In the Shumagin Island area, peak spawning occurs between February 15 – March 1, while in Shelikof Strait peak spawning occurs between March 15 and April 1. It is unclear whether the difference in timing is genetic or caused by differing environmental conditions in the two areas."

This points to considerable uncertainty about spatial and stock structure in the GOA, though the location of the major spawning sites appears to be well described. Nevertheless, the assumption for management purposes of a single stock within the GOA region does not appear to be unreasonable. Although individually "noisy", the trends from the various biomass surveys that cover different portions of the area are in general agreement over the past 15 years (Dorn et al, 2003, Figure 9), and strong and weak year classes from different areas of the fishery also seem to correspond. Measures are also made in regulations to spread catches in time and space. Therefore the fishery appears to meet all the points at the 80 scoring level for this indicator.

Indicator 1.1.2.3.4.3 There is knowledge of the life history characteristics of the species/stocks.

The intent is to evaluate the adequacy of knowledge of life history characteristics to undertake robust assessments. Life history characteristics include somatic growth, natural mortality, and fecundity (by size and/or age).

100 Scoring Guidepost

- There is comprehensive knowledge of life history characteristics of all significant stocks.
- Dependence of life history parameters on density, environment and ecologically related species is well understood and taken into account.

80 Scoring Guidepost

- The knowledge of life history characteristics of all significant stocks is well enough known that changes in the productivity and abundance of the stocks through time and space can be tracked.
- Sensitivities to uncertainties in life history parameters are included in assessments.

60 Scoring Guidepost

- Life history parameters are uncertain and these uncertainties are not adequately accounted for in assessments or harvest strategies.

SCORE: 85

Extensive life history information has been collected for pollock since the late 1970s from fishery monitoring, resource surveys and targeted research studies (e.g. see summary in NMFS, 2001). There has been routine collection of data on age, size, sex, and maturity leading to estimates of growth, natural mortality and maturity at age. Godo (2003) points out that there have been significant changes over time in weight at age and maturity at age. The former at least is incorporated directly in the assessments. Changes in productivity due to changes in recruitment are well described if not well understood. Efforts have been made to understand changes in the predation component of natural mortality (Hollowed et al, 2000; Livingston and Jurado-Molina, 2000), but these are not currently taken into account explicitly in assessment models. (The latest assessment (Dorn et al, 2003) does explore changes in natural mortality with age and with time in an appendix to the SAFE report). The sensitivity of the assessment to changes in life history parameters has been explored in previous SAFE reports.

This indicator clearly meets the 80 scoring guidepost and scores slightly better due to efforts to explore the impacts of predation on natural mortality.

Indicator 1.1.2.3.4.4 There is knowledge of the behavior (movement, migration, feeding, reproduction) of the stocks.

100 Scoring Guidepost

- There is comprehensive knowledge of the behavioral ecology of the species and of significant stocks.

80 Scoring Guidepost

- The knowledge of the behavioral ecology of the species and of significant stocks is sufficient to undertake robust assessments.

60 Scoring Guidepost

- Uncertainty about the behavioral ecology of the species results in significant uncertainty in interpretations of data or in assessments of stock status.

SCORE: 90

In general, the knowledge of behaviour and movement of pollock is sufficient to undertake robust assessments. Studies of behaviour over 40 years are reported and summarized in Smith (1981), Brodeur et al (1996), and Livingston (1991). Extensive studies of pollock reproduction and early life history have been conducted under NOAA's FOCI program (Fisheries Oceanography Cooperative Investigations). Marz (2003) cites Godo (2003) regarding uncertainty about "leakage" from Bering Sea pollock to the GOA. However the very different patterns in recruitment in the two areas suggest that this is not a major factor. Godo (2003) also discusses the fact that the surveys do not cover the entire range of the stock, and suggests tagging studies to measure pollock movement. However the evaluation team notes that the surveys are not treated as absolute estimates of biomass in the assessment, which mitigates the concern about coverage.

The knowledge of behaviour seems more than adequate for stock assessment purposes.

Indicator 1.1.2.3.4.5 There is information necessary to measure trends in abundance of stocks.

100 Scoring Guidepost

- Comprehensive fishery independent surveys of abundance are undertaken on an annual basis covering all significant stocks.
- Time series of surveys extend back to the start of significant fishing.
- Survey design and sampling methods are statistically rigorous and robust.

80 Scoring Guidepost

- Fishery independent surveys of abundance are undertaken on a frequent basis covering all significant spatial components of the population.
- Survey design and sampling methods are statistically rigorous and robust.

60 Scoring Guidepost

- Fishery independent surveys of abundance are sporadic.
- Variations in survey design over time have resulted in significant uncertainties about trends in relative abundance.

SCORE: 90

Several fishery independent surveys of abundance are undertaken for the GOA. Echo integration trawl surveys of Shelikof Strait (the main spawning area in the GOA) have been conducted annually since 1981 (except for three years: 1982, 1987 and 1999). However there was a change in the survey design and gear used in the early 1990s, so the assessment treats the data as two time series. The Alaska Department of Fish and Game conducts (usually) annual crab/groundfish surveys, and NMFS conducts a three yearly bottom trawl survey (every two years since 1999). There were also egg production surveys from 1985 to 1992 in Shelikof Strait, and sporadic trawl surveys from 1961 to 1982 covering the development phase of the fishery. While only the Shelikof Strait surveys are designed specifically to measure trends in abundance of pollock, the other surveys catch considerable quantities of pollock, are statistically well designed and executed, and show broadly consistent trends in abundance.

Since the release of the draft report, Godo (2003) has undertaken a comprehensive review of the GOA surveys. Marz (2003) summarizes the main issues raised in that review as follows:

- The AFSC bottom trawl survey lacks vertical coverage and does not representatively cover the stock due to size dependent vertical distribution.
- The limited geographic coverage of the EIT survey makes it very susceptible to changes in the distribution of the stock.
- The bottom trawl survey gear uses an old fish trawl that is non-optimal for sampling purposes.
- No reliable recruitment indices are available from the AFSC bottom trawl survey due to the selectivity of the trawl and the lack of vertical coverage.
- The EIT survey bases the assessment on an old acoustic target strength, which was measured during feeding season.
- The bottom trawl used in both the NMFS and EIT surveys is highly size selective and changes in growth over time may cause inter-annual changes in catchability by size.
- The surveys are particularly susceptible to critical assumptions during periods of ecosystem instability (regime shifts) due to the gaps in geographic and vertical coverage.

While the evaluation team does not disagree with these criticisms, it does not feel that they compromise the overall assessment. Several of the points would be of concern if the surveys were being used as absolute rather than relative indices of abundance. (The only one used as an absolute index, the AFSC bottom trawl survey, actually underestimates absolute abundance, which is a conservative assumption). Several points act to decrease the precision of surveys, and increase the inter-annual "noise". While this is not desirable, it does not lead to a bias in the assessment, and the fact that the assessment relies on a suite of surveys is a clear strength.

In summary, the availability of fishery independent survey data using several sampling methods is one of the strengths of the assessment and management of this fishery. The abundance time series based on the different methods, though noisy, show broadly consistent trends, and between them cover the entire history of the fishery. The score between 80 and 100 for this indicator reflects these strengths, noting that survey designs could be improved as indicated by Godo (2003).

Indicator 1.1.2.3.4.6 There is knowledge of environmental influences on stock dynamics.

100 Scoring Guidepost

- Impacts of regime shifts and inter-annual variability in environmental conditions are well understood and incorporated in the assessments.

80 Scoring Guidepost

- Impacts of regime shifts on stock abundance have been studied, and where appropriate are taken into account in the assessment.
- Impacts of inter-annual variability in environmental conditions on distribution and availability of fish have been studied and inform the stock assessment process.

60 Scoring Guidepost

- Environmental variability is largely ignored in assessments.

SCORE: 80

Considerable research has been undertaken on environmental variability and longer-term "regime shifts" in both the Bering Sea and the Gulf of Alaska, including in relation to pollock productivity and dynamics (e.g. FOCI program described in Schumacher and Kendall 1995; see also discussion of this issue under Principle 2). The 2002 assessment for GOA Pollock includes an extended analysis and discussion of environmental influences on year class strength based on three physical and two biological time series from the FOCI data (Dorn et al, 2002). These analyses are used to forecast the strength of the current (2002) year class. Allowing for changing selectivity in the fishery covers possible inter-annual shifts in distribution of stocks that may be environmentally driven.

While a start has clearly been made to incorporating environmental data into fishery assessments, the robustness of these assessments to uncertainties posed by short and longer term environmental variability has not been assessed. This issue is picked up in the conditions for certification under scoring indicator 1.1.1.5.

In responding to the draft report, Marz (2003) provides a very long critique of the concept and influence of "regime shifts" in the GOA, and accuses the NMFS of "heavy handed reference to regime shift theory" that "completely overshadows other research from the Fisheries-Oceanography Coordinated Investigations (FOCI) program, for example, showing that annual oceanographic conditions influence pollock larval and juvenile survival (hence recruitment) at a variety of temporal scales ranging from weeks to months and occurring on spatial scales of tens to hundreds of kilometers". Marz goes on to say that "The take-home lesson from the available fish recruitment research seems to be that the dynamics of currents, mesoscale eddies, frontal boundaries of water masses, local-scale nutrient supplies, etc., are at least as important as the hypothesized effects of decadal-scale regime shifts, acting in concert with predation by other fishes, birds, and mammals and the added pressure of fishing mortality in recent decades".

The evaluation team does not see a conflict between the two scales of analysis (long term and broad scale versus short term and local scale). The FOCI program analyses are very interesting and seem to be starting to provide some useful information for short term predictions about year class strength. On the other hand the long term patterns in recruitment (based on estimation of year class strengths from the stock assessment, and without any hidden "environmental" drivers) provide the clearest evidence of long term changes in productivity of GOA pollock. Whether these changes are attributed to "regime shifts" is not really important – the empirical fact of the changes in productivity is clear – and as shown in Dorn et al (2003), these changes cannot be attributed to changes in spawning stock levels. Both recent reviews of the GOA stock assessment (Godo, 2003 and Haddon, 2003) also stress that this system is clearly driven by some (not well understood) environmental factors, and, as Haddon notes, is "not at equilibrium".

Marz (2003) concludes the comments on this indicator by noting: "We have seen that as long as fishery yields remain robust, NMFS takes credit for managing conservatively by the rules of the $F_{40\%}$ policy, but if a stock fails to equilibrate around the lower $B_{40\%}$ target stock biomass assumed by this theory and plummets under fishing pressure, the agency blames the weather". The evaluation team is of the view that environmental factors do play a major role in the dynamics of pollock in the GOA. The team is concerned that the current harvest strategies may not be robust to this type of variability, hence the condition attached to scoring indicator 1.1.1.5. With regard to the current indicator, which concerns the way in which environmental influences are accounted for in the stock assessment process, the 80 scoring level is clearly met by the fishery.

SSSSC 1.1.2.3.5: There is adequate knowledge about the fishery.

As with SSSSC 1.1.2.3.4, adequacy is judged by the impact of uncertainty about particular factors on the assessment, and on the way that feeds through to the harvest strategy and to management of the resource.

Indicator 1.1.2.3.5.1: All major sources of fishing mortality for the stocks are measured and accounted for.

100 Scoring Guidepost

- All sources of fishing mortality, including catches from all fleets, by-catch from other targeted fisheries, and catches outside the management area that impact on the stocks, are measured accurately using a comprehensive at sea observer program.

80 Scoring Guidepost

- Catches from the target fishery and significant by-catch fisheries are recorded through an at sea observer program with adequate statistical coverage.
- Catches from outside the management area of the target fishery that impact on the target stocks are available, and are used in the assessment.

60 Scoring Guidepost

- Catch monitoring is inadequate to estimate significant sources of mortality due to fishing.
- Catches from outside the management area that impact significantly on the stocks are largely ignored.

SCORE: 85

Observation and recording of catches from all fleets within the Alaska fishing zone are undertaken at a high standard. For the GOA pollock fleet, there is 30% at-sea observer coverage of much of the fleet (vessels greater than 60 feet). In addition there is full monitoring of all catches at point of landing. There is very little by-catch of pollock in other fisheries in the US zone, and these appear to be adequately monitored. While catches by Russian fleets outside the US EEZ appear to be a concern for the Bering Sea stocks, this does not seem to be the case for the Gulf of Alaska. The North Pacific Groundfish Observer Program was reviewed externally in 2000 (MRAG Americas 2000). They generally endorsed the monitoring program, though they did express concerns about the fact that the at-sea observer coverage was not randomized with regard to fishing trips. There are current moves to address this issue (Bill Karp, NMFS, pers. comm.), but suggested changes have not yet been implemented. By international standards, the catch monitoring exceeds the 80 scoring guidepost, but concerns about bias in observed trips places it well short of the 100 level.

Indicator 1.1.2.3.5.2: The age and/or size structure of catches are measured.

100 Scoring Guidepost

- Comprehensive data on the age and size structure of all significant catches are available.
- Comprehensive data on the age and size structure of catches from fishery independent surveys are available.

80 Scoring Guidepost

- Data on the age and size structure of catches in the main target fishery are available, with adequate statistical coverage.
- Data on the age and size structure of catches from fishery independent surveys are available, with adequate statistical coverage.

60 Scoring Guidepost

- Age and/or size data are available but sample sizes are barely adequate.
- Analyses do not take proper account of uncertainties in age and/or size samples.

SCORE: 90

In general, comprehensive data are available for the GOA fishery on the age and size structure of commercial catches, and from surveys (NMFS, 2001; APA, 2002). Age and size data from the commercial fishery have been obtained since the 1970s based on at sea sampling from the North Pacific Groundfish Observer Program (Volstad et al, 1997). Observer coverage for the GOA fishery is at 30% for larger vessels. As noted for the previous indicator, this program was the subject of independent review (MRAG Americas, 2000), and some concerns were noted about possible bias due to non-random selection of trips with observers. Godo (2003) also expresses concerns about some of the sample sizes for age determination from surveys. (Concerns about biases in the age sampling of surveys are accounted for in the estimation of selectivity). Despite these reservations, the age sampling for both catches and surveys is clearly adequate to consistently detect the periodic large year classes that are a feature of the dynamics of this stock (Dorn et al, 2003, Figures 7 and 8). There are no consistent biases in the fit of the stock assessment model to the age data (Dorn et al, 2003, Figures 18-20), either from surveys or from the commercial fishery. The score for this indicator therefore seems to fall between the 80 and 100 levels.

Indicator 1.1.2.3.5.3: Fishing methods and patterns are well understood and recorded.

100 Scoring Guidepost

- There is comprehensive knowledge of spatial and temporal patterns of fishing for all fleets impacting the stocks.
- There is comprehensive knowledge of the gear used in all significant fisheries impacting the stocks, and the selectivities of the gear are well estimated.

80 Scoring Guidepost

- There is comprehensive knowledge of spatial and temporal patterns of fishing for the major target fishery.
- There is comprehensive knowledge of the gear used in the major target fishery, and the selectivities of the gear are well estimated.

60 Scoring Guidepost

- Spatial and temporal patterns of fishing are not well understood or not recorded.
- Changes in the types of gear used over time in the fishery have not been consistently recorded.

SCORE: 100

Spatial patterns of fishing and selectivities of gear are well understood and measured for all US fleets significantly affecting Alaskan stocks (NMFS, 2001). Detailed spatial maps of distribution of pollock catches are often presented in SAFE reports (e.g. Dorn et al, 2002, 2003). Moreover, selectivities of commercial and survey gear appear to be well estimated in assessments (Dorn et al, 2002). Targeted pollock fishing in the GOA is now principally undertaken using mid-water trawls, with only 6% of targeted Pollock taken with bottom trawls from 1996 to 2000 (Hiatt et al, 2001).

Subcriterion 1.2 - There are well-defined strategies for managing exploitation of significant by-product species.

The intent is to ensure that species taken as by-product of targeted fishing for pollock are not overfished due to the impacts of pollock fishing. "Significant" by-product species are here interpreted as either 1) those that are managed using TACs or 2) any species that comprises more than 0.5% of the total catch of the pollock fishery. By-catch of protected species is dealt with under Principle 2.

Indicator 1.2.1: There is formal and comprehensive monitoring of catches of by-product species in this fishery.

100 Scoring Guidepost

- Comprehensive observer coverage provides estimates of catches of all by-product species.

80 Scoring Guidepost

- A statistically robust catch sampling program provides estimates of catches of all by-product species.

60 scoring guideline

- Catches of some by-product species are not recorded, or are inadequate to assess the impact of pollock fishing on those species.

SCORE: 80

By-catch rates are very low in the GOA fishery. The North Pacific Groundfish Observer Program records data on all significant by-catch species (as defined above) for the primary pollock fleets. As noted for scoring indicator 1.1.2.3.5.2, this program was recently subject to external peer review (MRAG Americas, 2000), which generally endorsed the program, but raised several concerns about the non-random selection of vessels for at sea observation in the vessel size range 60 to 125 feet, where there is 30% observer coverage. By international standards, the observer coverage and sampling is very good, but concerns about bias in sampling and lack of independent verification of the adequacy of sampling (such as the consistency and good model fits shown for the age data) limit the score to the 80 level.

Indicator 1.2.2: There are assessments of significant by-product species.

100 Scoring Guidepost

- There are comprehensive assessments of all significant by-product species.

80 Scoring Guidepost

- The impacts of the pollock fishery on all significant by-product species are assessed.

60 Scoring Guidepost

- The impacts of the pollock fishery on most significant by-product species are assessed.

SCORE: 95

All significant by-product species as defined above (Pacific cod, halibut, five other flatfish, herring and salmon) are subject to annual scientific assessment, either by the NPFMC, the International Pacific Halibut Commission, or by the Alaska Department of Fish and Game (NMFS, 2001).

Indicator 1.2.3: There are strategies to control catches of significant by-product species in the pollock fishery.

100 Scoring Guidepost

- All significant by-product species are subject to robust and precautionary harvest strategies.
- This includes constraints on the catch levels on those species from the pollock fishery.

80 Scoring Guidepost

- Catches by the pollock fishery are constrained for by-product species subject to TACs.
- Catches for other significant by-product species are constrained to be within acceptable limits based on assessments of the impacts of the pollock fishery on those species.

60 Scoring Guidepost

- Catches on some significant by-catch species are not constrained, or the constraints are ineffective.

SCORE: 90

The targeted fisheries for pollock are generally “clean”, with particularly low (less than 5%) rates of by-catch of other species (Dorn et al, 2003). Nevertheless, the scale of the pollock fishery means that even low rates of by-catch can result in significant tonnages of catch of other species. For example, out of a GOA pollock catch of 73,000 tons in the year 2000, about 2,000 tonnes of Pacific cod, halibut and arrowtooth flounder combined were taken, and about 26,000 salmon of various species (APA, 2002). There was a slight increase in the trend in by-catch levels for flounder from 1996 to 2000, but by-catch levels for most groups are somewhat erratic from year to year, and no obvious trends are discernible.

Strategies to address by-catch in the GOA include specific caps on take of by-product species, based on assessments of those species. The use of these caps on take of by-product mean that pollock fishing is not a direct threat to the sustainability of any of these significant by-product species.

MSC Criterion 2

Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

Our interpretation of MSC Criterion 2: We wish to assess if there is a management strategy designed to keep targeted stocks from becoming depleted, and to promote recovery if they become depleted. Note that this has already been partially assessed under SSC 1.1.1, which considers the harvest control rule for setting ABCs at low stock sizes. SSC 1.1.2 has also assessed whether stocks are in fact depleted.

Subcriterion 2.1 - There is a well-defined and effective strategy to promote recovery of stocks that become depleted.

Indicator 2.1.1: Rules for setting TACs at low stock sizes promote recovery within reasonable time frames.

100 Scoring Guidepost

- Exploitation rate is set to zero if stocks are assessed to be below an appropriate threshold minimum stock size.

80 Scoring Guidepost

- Exploitation rate is reduced as stocks decline below threshold levels, sufficient to promote rapid stock recovery.

60 Scoring Guidepost

- Exploitation rate is not reduced at low stock size, or insufficiently to promote rapid stock recovery.

SCORE: 75

This indicator has been scored the same across stocks in GOA and BSAI, and the same as indicator 1.1.1.5. Although exploitation rates are reduced for tiers 1 to 3 at low stock size, there is little demonstrated empirical evidence or simulation results to suggest whether this is adequate to promote rapid recovery. Theoretical results (e.g. Thompson, 1998) assume resilience and rapid recovery. Empirical evidence for the Bogoslof area and the "donut hole" suggest very slow recovery rates once stocks are depleted (Bogoslof continues to decline with no fishing).

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the same conditions that are required under indicator 1.1.1.5. No additional work would be required at this time.

SSC 2.1.2: Other contingency management measures have been considered to promote stock recovery.

The intent is to assess whether there are additional contingency measures (other than reducing TACs) that would be put in place in the event that stocks were found to be depleted. Such additional measures might include closed areas, seasonal closures and gear restrictions.

Indicator 2.1.2.1: There is a specific recovery plan in place including measures other than TAC reductions.

100 Scoring Guidepost

- There are comprehensive and pre-agreed responses to low stock size that utilize a range of management measures to ensure rapid recovery.

80 Scoring Guidepost

- Recovery plans in the event of severe depletion include a range of management measures other than quota reductions.

60 Scoring Guidepost

- There are no specific recovery plans in the event of stock depletion other than reductions in TACs.

SCORE: 80

Management tools other than TACs clearly exist and are used (e.g. see comments on indicator 1.2.3) but their use is not explicitly linked to recovery plans. However APA (2002) have pointed to use of closed areas (Bogoslof), closures to directed fishing (AI), and time-dependent catch limits (for EBS and GOA Pollock) that have been applied when it was deemed they were needed. In retrospect, the evaluation team considers that, while it is clearly sensible to consider a range of responses to stock depletion, prescribed responses other than catch reductions may be problematic in that it is difficult to predict the circumstances in which particular measures may be appropriate. Clearly reducing or eliminating catches is the most straightforward way to promote stock recovery. This indicator is therefore given an 80 passing score based on empirical evidence of past responses.

MSC Criterion 3

Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

Our interpretation of MSC Criterion 3: The effects of fishing on the "reproductive capacity" of the target populations should already have been assessed under criterion 1. To the extent that Criterion 1 may not have done so, Criterion 3 considers specific concerns about impacts of fishing on age, sex and genetic structure of populations. Because genetic structure is very difficult to determine (and is frequently uninformative) in most exploited fish populations, impacts on "local stocks or spawning units" are used as a proxy at the 80% scoring level.

Subcriterion 3.1 – The harvest strategy maintains the reproductive capacity of the target species.

Indicator 3.1.1: The age, sex and genetic structure of the stocks are monitored.

100 Scoring Guidepost

- There is comprehensive monitoring of the age and sex structure of the populations.
- The genetic structure of the population is monitored.

80 Scoring Guidepost

- Monitoring of the age and sex structure of the population is adequate to detect threats to reproductive capacity.
- Assessments include an evaluation of depletion of local stocks or spawning units.

60 Scoring Guidepost

- Monitoring of the age and sex structure of the population is inadequate to reliably detect threats to reproductive capacity.
- No attempt is made to monitor the status of local stocks or spawning units.

SCORE: 85

Monitoring of age and sex structure appears to be more than adequate to detect threats to reproductive capacity (see also indicator 1.1.2.3.5.2). Sex ratios are stable at 1:1, size and age at maturity has remained stable, and there is no evidence for negative long term changes in mean age (Dorn et al, 2003, Figure 10). Marz and Stump (2002) express concerns about fisheries reliant on a few age classes. However this seems to be a function of the patterns of recruitment variability rather than a clear impact of fishing. There is monitoring of stocks in both the known spawning areas (Shelikof Strait and Shumagin), but while there are differences in timing of spawning between these areas (Dorn et al, 2003), assessment results do not suggest that these represent isolated stocks that should be managed separately.

Indicator 3.1.2: There is knowledge of the dynamics of sex structure in the species.

100 Scoring Guidepost

- There is comprehensive knowledge of the dynamics of sex structure in the species.

80 Scoring Guidepost

- Knowledge of the sex structure and dynamics are adequate to assess threats to reproductive capacity.

60 Scoring Guidepost

- The dynamics of sex structure in the population is largely unknown.

SCORE: 100

There are no obvious complexities in sex structure for this species (e.g. sex change), there is comprehensive monitoring, and there are no current threats to reproductive capacity due to changes in sex structure, which has remained stable over the past 14 years (Dorn et al, 2003).

Indicator 3.1.3: Information from stock assessment does not indicate problems with reproductive capacity (spawning stock and recruitment).

100 Scoring Guidepost

- All data and assessments indicate spawning stock and recruitment at healthy levels for all genetically identifiable stocks.

80 Scoring Guidepost

- There are no long-term downward trends in spawning stock levels or recruitment due to impacts of the fishery for local stocks or spawning units.

60 Scoring Guidepost

- Long-term downward trends in spawning stock levels and recruitment for some local stocks or spawning units have been detected.

SCORE: 70

The GOA stock has exhibited a long term decline in spawning stock levels (see Dorn et al, 2002 and Appendix 3), but as discussed for indicator 1.1.2.1, the reasons for this may be complex, and partly or even mainly due to natural environmental cycles. The two indicators are scored the same.

Condition

The condition for this indicator is the same as for indicator 1.1.2.1. No other conditions are required at this stage.

MSC PRINCIPLE 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent: The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Introduction

This scoring and report has been produced on the basis of our discussions with NMFS staff and others, and making use of published literature, reports (especially those provided by NMFS), and written submissions from the At-Sea Processors Association (APA, 2002), WWF (Bernstein *et al.*, 2002) and from Trustees for Alaska (Marz and Stump, 2002). The enormous amount of literature on the walleye pollock *Theragra chalcogramma* fisheries and the ecological context in which they operate, including the draft PSEIS and BiOps (National Marine Fisheries Service, 2001a-h, 2002a-c) and independent reports (Bowen *et al.*, 2001; Committee on the Alaska Groundfish Fishery and Steller Sea Lions, 2002) (we have consulted about 10,000 pages of reports and scientific publications on aspects related to Principle 2 alone, many but by no means all of which are listed in the Bibliography of this report) make this not only one of the world's largest fisheries (considering the EBS and GOA fisheries together) but also one with an exceptionally large quantity of associated literature.

The extreme generosity of NMFS staff, Council and committee members in making their time available to us to locate and provide relevant information has been very much appreciated. In particular we thank Professor G.L. Hunt for sending electronic versions of two important papers that were then 'in press' (now published as Hunt and Stabeno 2002, and Hunt *et al.* 2002b).

In considering aspects related to Principle 2 we have set the specific details related to this fishery into the wider context of a developing use of an 'Ecosystem Approach' to fisheries management. The use of single-species fish stock assessment and management has been well established over many decades by the fisheries science community, and the broad methods and modeling approaches are well known and thoroughly developed. In contrast, 'Ecosystem Approaches' to management of fisheries are at a relatively early stage of development. Although there is a wide literature emphasizing the importance of the ecosystem approach (e.g. Apollonio, 1994; FAO, 1995; Christensen 1996; Botsford *et al.*, 1997; Constable *et al.*, 2000; Moore and Jennings, 2000; Jennings *et al.*, 2001; Rice, 2001; Yodzis, 2001; Zabel *et al.*, 2003), rather few fisheries have ecosystem considerations explicitly incorporated into their management (but see Constable *et al.*, 2000; Jennings *et al.*, 2001; Lewis *et al.*, 2001a; Furness, 2002).

With regard to an ecosystem-based management approach, the pollock fisheries have expressed both the intent to act in an environmentally responsible way (Ecosystems Principles

Advisory Panel, 1999) and have set many regulations that are key steps in the development of ecosystem-based management. These include regulations to institute comprehensive observer coverage, extensive Marine Protected Areas (MPAs), numerous measures to reduce bycatch, discarding, impact on the benthos, and to avoid reducing the prey field of the Endangered top predators (National Marine Fisheries Service, 2001a).

There is also a very considerable research effort into many aspects of the ecology of the Gulf of Alaska (GOA). This research is internationally respected as of a very high quality, and much of the research is directly relevant to the position of pollock within the ecosystem and to interactions between the pollock fishery and ecosystem processes. Some aspects of Pacific ecosystem research are not only directly relevant but also outstanding science (for example the Resource Ecology and Ecosystem Modeling Task (REEM) located within REFM at NMFS AFSC, which provides a continuing research program aimed at understanding mechanisms through which the Alaska fisheries may cause adverse effects on vertebrate and invertebrate biodiversity, community structure and population dynamics).

Ecosystem Function

There is general agreement that the two factors most likely to affect marine food webs are environmental change and fisheries (Moore and Jennings, 2000; Jennings *et al.*, 2001). However, distinguishing between the impacts of fisheries and the influences of environmental change on marine biodiversity, food web structure, and animal population dynamics has long been a challenge to biologists, and a source of great divergence of opinion and dispute. Often, perhaps normally, food webs in areas with extensive fisheries are affected both by fisheries and by environmental change. There are many examples that could be used to examine this issue. We have chosen examples from the North Sea and the Barents Sea, as well as from the Bering Sea. Looking at what we can learn from various examples can be very useful in making predictions about how conservation of target species biomass alone may or may not be sufficient in terms of conserving wider ecosystem components.

The North Sea provides some interesting examples to learn from, many fish stocks are very heavily exploited, but are also influenced by climate and oceanography. The collapse of herring *Clupea harengus* stocks has been attributed to oceanographic change as well as to overexploitation by the purse-seine fleet. Gadoid stocks were reduced during early decades of the 20th century, and have been further depleted in recent decades. However, in the period following the herring and mackerel *Scomber scombrus* stock collapses, there was a huge increase in gadoid recruitment known as the ‘gadoid outburst’. This appears to have been caused by trophic interactions (mackerel feeding on gadoid larvae keeping recruitment down before the mackerel stock was reduced) but may also have been affected by environmental determinants of gadoid recruitment. Food web studies indicate trophic interactions to have been very important in the North Sea.

The ICES Multispecies Assessment Working Group (ICES, 1997) estimated that over the last three decades, mackerel, whiting *Merlangius merlangus*, haddock *Melanogrammus aeglefinus*, gurnards and the industrial fishery were the largest consumers of sandeels *Ammodytes marinus* in the North Sea, but the amounts taken by these consumers varied considerably over years, primarily as a result of changes in predator population sizes. In particular, the North Sea stock of mackerel collapsed in the early 1970s and has failed to recover since, so that the mass of sandeels consumed by North Sea mackerel has fallen dramatically, from almost two million tonnes in 1974 to less than 100,000 t each year from 1986-93. Consumption of sandeels by other predators is estimated to be much less than by mackerel. However, there has been a downward trend in consumption by whiting and by haddock as these stocks have decreased from the 1970s to the 1990s. During this period, however, the industrial catch of sandeels has grown. Adding together the industrial catch with the consumption by mackerel (North Sea and western stocks when in the North Sea), whiting, haddock and seabirds, the summed consumption of sandeels shows virtually no overall change from 1976 to 1995 (Furness, 2002).

Breeding productivity of black-legged kittiwakes *Rissa tridactyla* monitored in Shetland, and in areas of the North Sea coast, showed significant correlations with the abundance of sandeels (as determined by VPA analysis), and kittiwake productivity at North Sea colonies also correlated with sandeel CPUE throughout the whole North Sea fishery (Furness, 1999), indicating that good years for the fishery tended also to be good years for kittiwake breeding. Seabird breeding numbers, diets, breeding success and general ecology have been studied in detail in the North Sea over many years (Klomp and Furness, 1992; Phillips *et al.*, 1996; Ratcliffe *et al.*, 1998; Caldow and Furness, 2001; Lewis *et al.*, 2001a,b). The ability of kittiwakes and many other seabirds to continue to breed successfully at most North Sea colonies and increase in numbers alongside a large fishery for sandeels confounded conservationists for some years (Furness and Tasker, 2000; Rindorf *et al.*, 2000). However, the depletion of predatory fish seems to have permitted increases in sandeel stock abundance despite development of a directed sandeel fishery, as the total consumption of sandeels has decreased rather than increased in proportion to the fishery take; hence kittiwakes and other seabirds have been able to coexist alongside the large sandeel fishery, probably because predatory fish stocks remain depleted (Furness, 2002). Most of these changes appear to be due to fishery impacts rather than to environmental changes.

The Barents Sea provides some additional examples, such as the capelin *Mallotus villosus* stock that has a historical biomass of 6-10 million tonnes, and serves as a food supply for cod *Gadus morhua*, whales, seals and seabirds (Gjøsæter, 1997). It supported an industrial fishery taking 1-3 million tonnes of capelin between 1973 and 1984, but the capelin stock collapsed to 20,000 t in 1987, recovered rather rapidly until 1992 but then collapsed again in 1993-95. Although the industrial fishery contributed to the first collapse by removing fish from a rapidly declining stock, the main cause of the collapse was high predation levels from increased stocks of cod, so this ecosystem, as the North Sea, has a history of fishery exploitation affecting abundances of food fish and prey available to top predators such as marine mammals (Bogstad and Mehl, 1997). Quantities of capelin taken by seabirds (Mehlum and Gabrielsen, 1995) were very small by comparison to quantities taken by cod, marine mammals or the industrial fishery (Gjøsæter, 1997), but the reduction in capelin abundance resulted in an 80% decrease in numbers of common guillemots (=common murres) *Uria aalge* in 1985-87, apparently as a result of starvation leading to mortality of young and adult birds in winter (Vader *et al.*, 1990; Krasnov and Barrett, 1995; Barrett and Krasnov, 1996; Anker-Nilssen *et al.*, 1997). Again, these changes appear to be primarily related to fishing rather than environmental effects, although the levels of recruitment of cod and herring are somewhat affected by sea temperatures.

The Gulf of Alaska is a region where there is strong evidence for variation in physical and biological oceanography over time scales of many years. These variations are often described as 'decadal scale oscillations' or 'regime shifts'. Long term data sets on climate, water masses, nutrients, plankton, fish and top predators provide strong support for the view that there have been major regime shifts in the Bering Sea and Gulf of Alaska, particularly around 1976/77 and 1989 (Hollowed *et al.*, 1998; Hare and Mantua, 2000; Hunt and Stabeno, 2002; Hunt *et al.*, 2002b). Coincidental changes in time series will sometimes arise by chance and could be confounded with regime shifts. Nevertheless, there are many long term data sets showing trends, or decadal variations in the abundances of animals, from planktonic invertebrates to marine birds and mammals, that have been interpreted as probably or possibly reflecting ecosystem changes driven by regime shifts (Hunt *et al.*, 2002b). It is against this strong environmentally driven variation that effects of fisheries must be sought, if fisheries management is to adapt to mitigate wider environmental impacts.

Unlike the North Sea and Barents Sea cases, in the Gulf of Alaska, relationships between seabirds, marine mammals and their prey stocks are not well known in terms of functional responses, and so there is great difficulty in assessing likely causal relationships. Different from the North Sea and Barrents Sea, there are no directed fisheries on forage fish in the GOA, so there is a need for experimentation and research more clearly directed at understanding relationships between natural predators and the stocks of pollock and other forage fish. Some work of this nature is now being carried out in Alaska (for example the GEMS program funded by Exxon Valdez restoration money) and is starting to provide insights into relationships between GOA predators such as seabirds and their prey 'food-fish' on an appropriate spatial scale.

According to the Report to Congress of the Marine Ecosystem Principles Advisory Panel (EPAP, 1999) large-scale marine fisheries can be expected to have top-down structuring effects on exploited marine ecosystems, much as any natural predator would exert control on the system. Since the GOA pollock fishery, harvests have been estimated to be similar in size to the consumption of some of the most important natural predators (Hollowed et al., 2000b), falling between about 40,000 t and 300,000 t in years from 1975-2003, the GOA Pollock fishery may also be seen as a top predator raising the question of whether harvest levels significantly affecting ecosystem function.

The recent investigation of the National Research Council into the causes of the decline in numbers of Steller sea lions *Eumetopias jubatus* (Committee on the Alaska groundfish fishery and Steller sea lions, 2002) also concluded that several hypotheses regarding the role of fisheries (disruption of feeding patterns, reduced carrying capacity through removal of prey species, shifting the distribution of species such that less nutritious fish dominate the prey base) were all plausible hypotheses to explain the decline of the sea lion population. However, they concluded 'In the existing body of information about Steller sea lions, there is no conclusive evidence supporting either the bottom-up or the top-down hypotheses'. On balance, the NRC panel suggested that unidentified 'top-down' factors were likely to be the main cause of the decline of Steller sea lions, rather than ‘bottom-up’ influences. Possible ‘top-down’ factors that may be likely to be major contributors to SSL decline include climate change and killer whale predation (Committee on the Alaska groundfish fishery and Steller sea lions, 2002).

The most recent review of the SSL decline (NMFS, 2003) is the ‘addendum to the Endangered Species Act – Section 7 Consultation Biological Opinion and Incidental Take Statement of October 2001’ put onto the web on 31 March 2003 for review. This review uses the latest biological data available to NMFS (and not yet in the public domain) to present a view that a bottom up impact of food availability to adult SSLs may be an important contributor to the decline. ‘A recent paper by Holmes and York (in press) indicates a drop in fecundity and juvenile survivorship from 1993-1998.' 'Nutritional stress is one possible cause for lower fecundity rates, but is not the only possible cause.' 'Additionally, new information suggests that there may be a density-dependent signal in the Steller sea lion decline (i.e., larger rookeries and haulouts declined faster than smaller sites from 1981-1991), which is also suggestive of a reduction in carrying capacity (Hennen, Symposium 2003). In summary, adult females may be an important component of the current decline. Current research projects are expected to explore this issue further over the next few years. NOAA Fisheries is also concerned about the survival of pups and juveniles which are more likely to be susceptible to prey depletions by commercial fisheries (see 2001 BiOp, sections 3.4.2; 4.2.13; 4.3.2; and 4.3.3). As described in Holmes and York (in press), juvenile survivorship was very low from 1983-1987, and dropped again from 1993-1998, and therefore is likely to be playing a role in the continued Steller sea lion decline in the western population.' (NMFS, 2003; page 12).

Fisheries may affect ecosystems in a variety of ways, and the signal created by fisheries may be difficult to identify against uncertain patterns of variation due to regime shifts, decadal scale oscillations and short term environmental variations (‘noise’). However, it is possible to make some predictions as to the environmental changes that might be anticipated as a result of fisheries. These will include direct impacts, such as those due to bycatch mortality or entanglement of marine mammals, and indirect impacts such as alteration of the availability or abundance of food for other species in the ecosystem.

In the specific case of the fisheries for pollock in the Gulf of Alaska, large harvests of an extremely abundant fish are taken, using mid-water trawls that can be targeted accurately onto schools of pollock. Given the low bycatch in these fisheries and low discard rate, impacts of these may be anticipated to be small. Increased mortality of marine mammals or seabirds through bycatch mortality, entanglement, or persecution by fishers, might be expected to be evident as more negative trends in population trajectories than would be seen in the absence of the fishery.

Harvesting reduces the abundance of the target fish stock below levels that would be present in an unfished stock. These reductions may reduce food availability to predators, especially those depending on pollock as their main food. In the GOA, pollock are predominantly zooplanktivores, with small fish forming about 15% of the diet (Yang and Nelson 2000). Removal of a major part of the biomass of piscivores from the food web may be expected to alter food web structure by reducing predation on food fish (including juvenile pollock), and/or by creating an opportunity for other piscivores to increase in abundance to substitute for the missing large pollock in the food web. Removal of a major part of the biomass of zooplanktivores from the food web may be expected to alter food web structure by creating an opportunity for other planktivores to increase in abundance. Given these predictions, are observed trends consistent with these?

Pollock abundance

The status of pollock stocks is described in detail in the report for the evaluation team's findings under MSC Principle 1. Briefly, we point out that pollock abundance in the GOA has declined considerably during the last 30 years. It is now at a level considered by NMFS to be about 29% of the model-predicted biomass in unfished conditions (2003 SAFE document for GOA pollock). However, evidence suggests that much of this decrease can be attributed to environmental conditions rather than to the effect of the pollock fishery (for more details see text under MSC Principle 1). Despite this decrease, pollock has consistently been the dominant species in the groundfish biomass and fluctuations in total biomass have predominantly been due to changes in population biomass of pollock (Livingston, 2001).

Most of the ecosystem requirements (particularly those raised by the NGOs) seem to regard mammal and bird interactions with the pollock as being due to lack of sufficient pollock for food. Where the GOA pollock stock is at a low level of abundance compared to the predicted biomass in an unfished condition, this is an understandable area of concern. However, the low caloric density of Pollock by comparison with other ‘forage fish’ species such as sandlance, capelin or herring, has also led to the ‘junk food hypothesis’ which suggests that predators may be forced to depend on pollock for food because abundances of preferred oily fish are low. Consequently, the hypothesis that these problems stem not from a lack of pollock but because the pollock are competing with other species (e.g. SSL) for other forage fish needs also to be considered. In regions like the Barents Sea and Iceland it is the small pelagics such as capelin that tend to be the key component in the diet of birds and mammals and their loss which causes crashes of icon species. Such small oily species are the ones which could well be diminished by a dominant pollock stock. It would seem that a fairly comprehensive multispecies modeling approach is needed which can at least explore such tertiary effects. Such modeling has been well advanced in the Gulf of Alaska area and needs to be directed in this specific context. Such models provide background to the management though they are rarely predictive enough to provide specific advice on TACs (However note that Barents Sea capelin quotas take account of the food requirement of cod). They may also provide a number of possible scenarios for management models to be tested against.

Steller sea lion declines

The western Alaska stock of Steller sea lions has decreased from over 160,000 in the early 1970s to about 30,000 in 2000 (DeMaster and Fritz, 2001). Steller sea lions feed extensively on pollock of all sizes, possibly obtaining the greatest net energy gain from catching the larger pollock. Calkins and Goodwin (1988) reported that pollock eaten by Steller sea lions in the GOA in the 1970s (mean 148 g) were larger than those eaten in the 1980s (mean 93 g). They suggest that changes in pollock stock age structure caused by the fishery could be a factor in the GOA sea lion decline in the 1980s.

Recent studies of SSL diet around Kodiak Island suggest that pollock is now only 4th rank in SSL diet after sandlance, arrowtooth flounder and Pacific cod (Wynne, Foy, Norcross, Hills and Buck, unpublished data). Given the low level of pollock stock in the last few years, such diet switching is to be expected. The NRC panel investigating the information available on the Steller sea lion decline presented a rather disconcerting admission of the inadequacy of the data base in this particular fishery – wildlife interaction, going so far as to say 'no hypothesis can be excluded based on existing data' (Committee on the Alaska groundfish fishery and Steller sea lions, 2002), but agreeing that 'resolution of this conflict requires management that not only improves chances for the recovery of Steller sea lions, but also facilitates scientific study of the efficacy of these protective measures'. However, the NRC panel suggested that food shortage appeared from the available evidence to be less likely to contribute to the decline than some 'top-down' factors. Nevertheless, the Ecosystems Considerations for 2002 report (Livingston, 2001, page 95) stated 'The close parallel of these [dietary] data (Sinclair and Zeppelin, submitted) with those of metapopulation patterns of decline (York et al., 1996) suggest that diet and decline of Steller sea lions are linked'.

More recent (continuing) analysis of SSL population trends at individual haul-out and rookery sites by Marc Mangel suggests that such an approach may provide strong inferences about the importance of the various factors suggested to determine SSL declines (see also text under Indicator 1.3.3).

Harbor seal declines

NMFS has characterized the Gulf of Alaska harbor seal (*Phoca vitulina*) stock as depleted, and unable to reach or maintain its Optimum Sustainable Population (OSP). It seems that since the mid-1970s there have been large declines in numbers of this species throughout Alaska but best documented in the GOA (Pitcher, 1990; Withrow and Loughlin, 1996; Livingston, 2001). Harbor seals in Alaska feed mainly on pollock, and take all size classes but probably obtain the greatest net energy gain from large pollock (Lowry *et al.*, 1996). In one study, Lowry *et al.* (1996) state 'although only 11 of the 23 pollock eaten were estimated to be over 30 cm long, those fishes contributed 84% of the estimated biomass consumed'. However, the cause of the harbor seal decline is uncertain and probably not simple. Many factors other than food abundance may play a role.

Arrowtooth flounder increases

Selective harvesting of commercially valuable species and large differences in catch rates for managed stocks may be a mechanism for initiating ecosystem-altering effects on the structure of groundfish assemblages and food webs over time. For instance, selective harvesting of high value species such as pollock may provide a competitive opportunity for species that are subject to much lower fishing mortality. This concern has been expressed repeatedly in the Ecosystem Considerations chapters of the annual SAFE documents since 1994. In the Gulf of

Alaska, arrowtooth flounder *Atherethes stomias* biomass has increased from 300,000 t in 1970 to over 2,000,000 t by 1997 (Hollowed *et al.*, 2000a). This species is a major predator of juvenile pollock (Livingston and Jurado-Molina, 2000). The biomass of arrowtooth flounder has increased by an amount similar to the reduction in biomass of large piscivorous pollock when the biomass of the latter under harvest is compared to the predicted biomass in an unfished stock.

Jellyfish increases

Although less well documented than changes in jellyfish abundance in the EBS, jellyfish biomass in the GOA has increased from very low levels in the early 1980s to much higher levels in the late 1990s (Livingston, 2001).

Conclusion regarding trends of populations that may be impacted by the pollock fishery

None of the above examples can be taken as proof that the GOA pollock fishery has been the cause of the observed trends, but all are consistent with effects that might be anticipated as a consequence of removing substantial quantities of pollock from the food web.

Interpretation of causal relationships

Although there is strong empirical evidence of changes in abundance of Steller sea lions, harbor seals, arrowtooth flounders and jellyfish, there is a remarkable lack of understanding of the extent to which these trends can be attributed to the consequences of pollock harvest. It is possible that none of the observed trends are a result of pollock harvest, but such a view cannot be supported by science because the key information is lacking. Equally, it is possible that all of these trends may be due to pollock harvest, but such a view cannot be supported by science because the key information is lacking. The empirical observation of trends suggests that the fishery might be causing the observed patterns; they are consistent with prediction. But correlations do not prove causation. This uncertainty is expressed in such documents as the PSEIS. For example 'Cumulative effects on species diversity are conditionally significant adverse due to factors associated with the groundfish fishery' and 'Conditionally significant adverse impacts on the three primary pinniped species due to harvest of prey species'.

Given the large size of the pollock harvest, it is surprising to find that so little of the research effort in previous years has been directed into studies that would determine the magnitude of the effect, if any, of the pollock harvest on the key marine mammals and other animal populations likely to be sensitive to this withdrawal of resources from the food web. Key elements of this research that might have been addressed are the assessment of changes in fish abundance and distribution within areas of Steller sea lion critical habitat comparing between closed areas and areas kept open to fishing; changes in Steller sea lion foraging ecology and demography resulting from the closure of critical habitat to pollock fishing (by comparison with areas open to pollock fishing); ecosystem modeling to identify the extent to which trends in arrowtooth flounder and jellyfish populations as ecological replacements of pollock are in accordance with the harvest of pollock taken from these food webs. The recent allocation of $40 million on SSL research indicates the strong desire to determine the key ecological relationships affecting SSL populations. Not withstanding this considerable (though short term) boost to research, various issues are identified below that remain to be resolved.

The current scarcity of research results on these key issues is all the more surprising given the very high quality of many of the scientific staff in NMFS and other relevant organizations. Indeed, some of the key research required has been proposed (for example the scientific testing of the consequences of closing pollock fishing within Steller sea lion critical habitat in some areas to compare outcome with unrestricted fishing within other areas of SSLCH). However, these proposals to resolve the question have not been taken forward, leaving the question unresolved, although the Council has recently reactivated its SSL committee specifically to consider the possible effects on sea lions and their prey by establishing closed and open areas near sea lion rookeries.

Ecosystem modeling that may elucidate the relationship between pollock harvest and arrowtooth flounder or jellyfish population trends is being started now, but is so far only at an early stage and appears to be only a small part of the NMFS research program rather than a high priority in terms of research budget allocation. The NRC panel's conclusion that too little is known about Steller sea lion – pollock fishery interactions to permit any of the numerous hypotheses regarding the cause of the decline of SSLs to be ruled out, clearly indicates that the relationships between the pollock fishery and other components of the food web of lower conservation focus (and this means almost everything else in the food web given that SSL is listed as an Endangered species and so attracts huge amounts of research interest and funding) will be likely to be even more uncertain.

With the limited understanding of the functional relationships between pollock and other important components of the food web, the evaluation team would expect the harvest of pollock to be taken in a precautionary manner that ensured that impacts on the food web would be restrained. We would also expect to see development of a long-term research strategy with a clear focus on testing the hypotheses concerning impacts of pollock harvest, not only on Steller sea lion (given its special status under the Endangered Species Act) but also on the other most plausible impacts of the fishery (i.e. on other predators feeding extensively on pollock such as harbor seals, certain seabirds; and on food web adjustments that might arise from depletion of a major part of the energy flow, such as alternative piscivores as arrowtooth flounder, and alternative zooplanktivores such as jellyfish). While we were given an account of the large amount and variety of research being conducted around the pollock fishery, we never were provided with an overall research strategy with specific long-term objectives.

MSC Criterion 1

The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

Our interpretation of MSC Criterion 1. There is a well-defined and effective strategy to ensure that ecological impacts of the fishery are monitored, and restrained to minimize impacts on ecosystem function (trophic relationships, community and habitat structure and biodiversity). This strategy is based on rigorous assessment and a sound database.

The GOA is a very dynamic ecosystem, with clear evidence of regime shifts and long term environmental change (Anderson and Piatt, 1999; Hare and Mantua, 2000; Napp and Hunt 2001). There is a very considerable research effort aimed at understanding the oceanographic processes and biological responses to these long term variations (e.g. Hunt et al., 1996a,b; Bailey 2000; Brodeur et al., 1999; Hollowed et al., 2001; Livingston 1999, 2000, 2001; Hunt and Stabeno, 2002; Hunt et al. 2002a,b). Fishery management is set in the context of this highly variable environment. Fishery managers have incomplete knowledge of the trophic relationships, competitive relationships and indirect effects of change within this ecosystem. The influence of oceanographic variability on these interactions adds further uncertainty, and causes changes in carrying capacity and food web structure (Trites et al., 1999).

Within Criterion 1 there are three equal divisions, Indicator 1.1, Subcriterion 1.2 and Subcriterion 1.3. Each of these subcriteria is further divided into further Indicators, 1.2.1 to 1.2.4 and 1.3.1 to 1.3.3. These are each considered in turn below:

Indicator 1.1. There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.

Intent statement: Pollock has a lower caloric density than that of many other ‘food fish’. As a consequence, it may be a less suitable food where animals require a high energy density diet in order to promote rapid growth of their young or to increase their own energy reserves. This has led, for example, to the ‘junk food hypothesis’ that suggests that pollock are nutritionally inferior to alternatives such as herring or myctophids, and that populations of top predators might increase if able to feed on large stocks of herring but may decrease if the food web is dominated by pollock (as at present). But in the Gulf of Alaska although Pollock are not as dominant a component of the fish community as in the Eastern Bering Sea, pollock still represent a high proportion of the overall food fish biomass, and form a large part of the diet of many ‘top predator’ marine mammals and seabirds. Given the importance of pollock as the primary food for many ‘top predators’ in this ecosystem, we consider that an ecosystem approach is especially important for this fishery (more so than for example in fisheries for other gadoid species that form a small part of the diet of wildlife where the ‘food fish’ of top predators tends to be gadoid prey rather than the gadoid stock itself). Thus despite the possible lower nutritional quality for food-stressed seabirds or marine mammals of pollock relative to herring, we consider the ecological role of pollock to be somewhat more similar to that of capelin in the Barents Sea, sandeel in the North Sea, krill in the Southern Ocean, than to the role of cod in the Barents Sea, cod, haddock, whiting and saithe in the North Sea, or hoki in New Zealand. Our aim with this indicator was therefore to identify whether management of the pollock fishery uses an ecosystem approach to management, based on a knowledge of the ecological relationships between the fishery, fish stock and other components of the ecosystem, and limits impacts of the fishery to below levels that can be identified as damaging to the wider ecosystem (as distinct from limits set on the basis of single stock management alone such as the need to maintain SSB to achieve adequate recruitment). In particular we were looking to see whether research had identified ecosystem effects of the fishery, whether these effects were taken into account in management decisions (such as setting ABCs and TACs), and whether a precautionary approach was used where information on impacts or the needs of other ecosystem components was poor. Therefore we developed the following scoring guideposts:

100 Scoring Guidepost

- There is a detailed ecosystem management plan based on well-understood functional relationships between the fishery and components of the ecosystem.
- This forms the basis for a fishery management strategy that restrains impacts on the ecosystem within defined bounds such as using 90% confidence intervals for setting ABCs in the single species context, and establishing a decision rule in the multi-species context similar to that employed in CCAMLR for krill, which explicitly adjusts the single species fishing level downward to account for the needs of other krill consumers in the ecosystem.
- These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high. They address risks associated with point estimates of ABCs and/or address the needs of dependent and related species explicitly.

80 Scoring Guidepost

- There is a management system with ecosystem components based on general knowledge of ecological relationships. This contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity.
- The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem.
- Where uncertainty is high, management to restrain impacts is precautionary.

60 Scoring Guidepost

- Despite attempts to develop a management system that includes ecosystem considerations, impacts of the fishery on the ecosystem have not yet been constrained within agreed and reasonable bounds.

SCORE: 75

Pollock catches in the GOA are generally conservative in the context of traditional single-species management. However, for a fish that is a major component of the diet of many species of marine mammal, seabird and predatory fish, the pollock fishery management must also account for the needs of predators in the ecosystem and for changes to food web structure that may be induced by removal of large quantities of pollock. What may be conservative in terms of avoiding depletion of spawning stock biomass and impacts on future recruitment may not necessarily be conservative in ensuring adequate densities of food fish for foraging dependent predators. Single species fishery management has a long history. We recognize that ecosystem based fishery management is an emerging concept, and a highly complex issue.

Stakeholders (Bernstein *et al.* 2002) provided the evaluation team with a report that highlights four aspects of pollock fishery management that currently limit the ability of managers to take ecosystem considerations into the fishery management plan. These are (1) 'incomplete knowledge of environmental influences on stock dynamics and of the effects of fishing on ecosystem structure making it difficult for managers to clearly distinguish the relative effects of natural and anthropogenic factors on pollock stock dynamics and ecosystems, or to predict how changes in ocean climate will affect stocks and ecosystems in future' (2) 'incomplete knowledge about the trophic relationships among pollock and other species in the ecosystem, making it difficult to determine management strategies that are optimal for preserving critical relationships' (3) 'uncertainties regarding the impact of the pollock fishery on the protected Steller sea lion making it difficult to implement regulatory measures that are certain to protect this listed species and hence comply with U.S. environmental laws' and (4) 'in setting objectives for the fishery, managers have not until recently incorporated ecosystem objectives that encompass species and habitats beyond the target stock'.

The Ecosystem Principles Advisory Panel (1999) established by NMFS to develop concepts of ecosystem management in the context of the Alaska groundfish fisheries stated that an ecosystem-based management approach would require managers 'to consider all interactions that a target fish stock has with predators, competitors, and prey species; the effects of weather and climate on fisheries biology and ecology; the complex interactions between fishes and their habitat; and the effects of fishing on fish stocks and their habitat'. In line with these principles, the 'Ecosystem Considerations' chapter presented as an Appendix to Stock Assessment and Fishery Evaluation Report for the groundfish resources of the EBS/AI and GOA (Livingston 1999, 2000, 2001) is an extremely impressive synthesis of a huge quantity of data on components of the ecosystem that may be affected by the pollock fishery. Few major fisheries around the world (and even fewer small fisheries) have gathered such detailed reviews of possible ecosystem interactions with fisheries. Noting this excellent effort, the evaluation team felt the management of the fishery still fell slightly below the 80 scoring guidepost, as the pollock fishery has not yet used the Ecosystems Considerations chapter in determining ABCs, an important step in setting the annual catch.

Efforts to avoid possible local depletion in areas of particular importance for foraging marine mammals (Steller sea lions in particular) have been of uncertain efficacy, and it appears have done rather little to reduce the very high proportion of pollock catch taken from defined 'critical habitat' of Steller sea lions. Given the potential influence of the pollock fishery on Steller sea lion prey fields, and the fact that ongoing studies have not yet provided a firm understanding, the management appears not to be as precautionary as one might expect in a position of continued uncertainty.

The continued high proportion of pollock catch taken in SSL critical habitat is of concern. In the GOA the harvest rate of pollock is relatively low by comparison with that in other fisheries for large gadoids. The harvest rate has been around 13% per annum in 1997-2001 (Dorn et al. 2002), which is around half the target rate for Icelandic cod, for example. Thus the fishery can correctly claim to be precautionary in setting a relatively low harvest rate. Nevertheless, about 70% of this harvest is taken from within SSL critical habitat, although the value varies considerably from year to year. For example, in 1999 harvest inside CH was 82.8% while in 2002 harvest inside CH was 54.9%, but the lowest in recent years was around 50% in 1991 and the trend in this percentage from 1991 to 2003 shows no consistent direction of change over the period (Figure 2.1.b).

An unpublished analysis of NMFS data on pollock in the GOA by Martin Dorn in October 2000 completed as part of the development of the 2000 Biological Opinion estimated from acoustic survey data that about 85% of pollock in the GOA occurred within SSLCH during the winter spawning period. He also estimated from bottom trawl research survey data that in summer about 75% of the pollock biomass west of 140 long. was in SSLCH. He inferred from these estimates that throughout the year most pollock in the GOA is within SSLCH.

We are aware of ongoing studies looking at the effects of fishing on Pollock distribution and density within SSL critical habitat., However, the effectiveness of constraints on fishing in areas close to Steller sea lion rookeries and haul-outs cannot yet be ascertained. Even the validity of the concept of 'critical habitat' for SSL is quite unclear. There is a lack of data on the extent to which SSL forage within 'critical habitat'. Initial radio tracking studies have provided some interesting data on this as they show where SSL may occur, but do not clearly discriminate between foraging and non-foraging distribution and behavior. More recent studies provide more detailed information, but there still appears to be significant uncertainty about the possible effects of fishing on foraging success by SSL inside and outside 'critical habitat'. There remains an urgent need to determine whether prey abundance within SSLCH (or indeed in larger areas around rookeries and haul-outs) affects the SSL population trajectory at the level of individual rookeries/haul-outs, and if so, whether the high take of pollock within SSLCH affects prey abundance for foraging Steller sea lions.
The initial draft PSEIS (now being redone) reports 'Conditionally significant adverse impacts on the primary pinniped species (Steller sea lions, harbor seals) due to harvest of prey species; Conditionally significant adverse impacts on the primary pinniped species are identified due to spatial/temporal concentration of the fishery' and 'Cumulative effects are identified for prey availability and spatial/temporal removal of prey for Steller sea lion, and harbor seal. These effects are conditionally significant adverse based primarily on competition for prey'. This is reflected in the 3 December 1998 BiOp and the November 2000 BiOp determining that the GOA pollock fisheries, as projected for 1999 through 2002, were likely to jeopardize the endangered western population of Steller sea lions and destroy or adversely modify critical habitat designated for this population (PSEIS p2.9-20). In contrast, the October 2001 BiOp using the initial telemetry data reversed the conclusion of jeopardy. Moreover, the draft addendum to the 2001 BiOp, prepared to meet the requirements cited by Judge Zilly continues to support the conclusion of no jeopardy.

In the draft PSEIS the agency reports 'The 1990s may be viewed as a period of continual modification of measures to manage groundfish operations to minimize their impact on non-groundfish fisheries, on marine mammals and seabirds, and on habitat'. Even though the draft report proposes a different approach to management, Alternative 2 in the PSEIS describes a new fisheries management policy framework that emphasizes increased protection to marine mammals and seabirds, the current management emphasizes continues to maintain a stable high annual harvest rather than protection of the wider ecosystem.

Rather than the current emphasis in stock assessment and TAC setting on predicting the most likely outcome, management might incorporate ecosystem considerations more readily by adapting a scenario planning approach, in order to seek management strategies that would provide suitable yields of pollock without major impacts on the wider ecosystem under a diverse range of assumptions regarding relationships between the fishery and ecosystem components and functions.

Regarding specific points in the 80 Guidepost, we accept that the management system could assist fishery managers in making adjustments to reduce impacts on the ecosystem, through the qualitative approach of annual 'Ecosystem considerations' chapters, and that aspects of management are precautionary. However, we feel that the fishery falls below the 80 guidepost for the variety of broad reasons outlined in the paragraphs above, and specifically because it remains unclear whether a lower limit reference point of B_{20} provides an adequate limit to stock exploitation to ensure an adequate biomass of pollock for natural predators, and because the high level of exploitation of pollock within SSLCH is of concern (and especially at a time when the stock biomass is at such a low level relative to predicted unfished biomass).

Condition

To improve the deficiencies in performance for this indicator, the fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries.

Fisheries science is still developing methodologies for introducing environmental parameters into fisheries models and the state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further such development, and so some time is required to allow the necessary developments (see below).

The plan must show how the authors of the 'Ecosystem Considerations' chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures.

Sc 1.2. Research is carried out on ecological relationships among species, and on impacts of the fishery on the structure and biodiversity of invertebrate and vertebrate communities in relevant habitats.

The intent is to enable an evaluation of the extent to which there are robust assessments or predictions of impacts of the fishery, and monitoring of the communities considered likely to be affected such that any important impacts are likely to be identified. Such assessments require not only relevant monitoring data but also procedures for the measurement of impacts in the context of natural variations. We appreciate that it is neither practical nor necessary to study the ecology of every species of animal in the ecosystem, but we seek to explore whether research is carried out in sufficient detail and for a suitable variety of animal taxa and community metrics in order to identify important functional relationships with regard to impacts of the fishery. This subcriterion is split into four separate Indicators.

Indicator 1.2.1. Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.

The intention of this performance indicator is to evaluate the extent to which the fishery demonstrates that it does not have unacceptable impacts on important habitats that might be vulnerable to alteration by the fishery.

Elements considered in scoring include:

- The effects of fishing on the habitat structure and productivity in fished areas, especially in areas used for spawning by fish.
- The effects of fishing on foraging economics of predators utilizing the fished area
- The effects of bycatch and discards/discharges on habitat structure and productivity in fished areas.
- Information on the extent of lost fishing gear and any physical damage caused to habitats.
- Information on the discharge of processing wastes, and their effects on the physical environment.
- Management response to these collected data.

100 Scoring Guidepost

- Important adverse effects of trawling on benthic and pelagic habitats are measured at intervals on a programmatic basis.
- Particular attention is given to effects of trawling on vulnerable habitats such as those inhabited by corals, and essential fish habitat or fish spawning areas.
- Impacts of fishing on food-fish abundance and distribution are measured, in particular as they affect availability of food for consumers such as endangered, threatened, protected, or icon species.
- Effects of discards and waste discharges on habitats are measured at intervals on a programmatic basis.
- Quantities of gear lost are recorded, and the impact of lost gear on habitats is measured.

- This information is presented in documents that are made available to stakeholders.
- Responsive management changes occur as a direct result of assessment findings.

80 Scoring Guidepost

- The effects of trawling on benthic and pelagic habitats have been assessed and the results presented in documents available to stakeholders.
- Particular attention is given to vulnerable habitats such as those inhabited by corals and those providing essential fish habitat.
- Impacts of fishing on food-fish abundance and distribution have been considered and presented in documents available to stakeholders.
- Effects of discards and waste discharges have been considered and presented in documents available to stakeholders.
- Gear loss has been reviewed and impacts on habitats considered and presented in documents available to stakeholders.

60 Scoring Guidepost

- Adverse effects of trawling on habitats, especially on essential habitat for fish or critical habitat for protected, endangered, threatened or icon species, are documented by sporadic investigations, but many of these are not in the public domain. Coverage of topics is incomplete. Quantitative estimation of impacts is therefore subject to much uncertainty.

SCORE: 79

The score is very close to the 80 guidepost. The effects of trawling on benthic and pelagic habitats have been assessed and the results presented to stakeholders, for example in the PSEIS, and attention has been given to vulnerable habitats. Impacts of fishing on food fish abundance and distribution, on discards and waste discharges and on gear loss have been subjected to assessment, but we feel that these assessments fall slightly short of the required level..

As the APA submission on Principle 2 points out, there is an extensive body of information documenting GOA ecosystem features, both physical and biological. Extensive monitoring programs also exist to update key data series and research programs on ecosystem characteristics, and these monitoring programs extend back various periods in time, thereby allowing for some developments in 'historical science' or the inclusion of past patterns of ecosystem change into analyses of present conditions. APA also provides details of assessments of the impact of the groundfish fisheries on habitats. The vast majority of the pollock catch is taken mid-water. Occasionally, however, mid-water trawls may hit the bottom, and this can contribute to trawl damage to benthic habitats and communities. Such impacts are very much greater where a fishery is using a bottom trawl, but the very size of the pollock fishery does raise the question of how frequently pollock trawls drag on the bottom. Analysis of the frequency of benthic items in pollock catches indicates that this is infrequent.

Many aspects of these assessments meet or exceed the 80 scoring guidepost, but the state of knowledge of the impact of pollock fishing on Steller sea lion critical habitat (SSLCH) falls short of this. Even with ongoing studies to assess pollock prey fields in SSLCH more fully, the effects of harvesting from SSL 'critical habitat' on fish prey fields are not yet known.

One of the major hypotheses set up to explain the decline in numbers of Steller sea lions is the 'localized depletion hypothesis' The localized depletion hypothesis suggests 'that the Pollock fishery (and the Atka mackerel and cod fisheries) cause localized depressions in the prey field around Steller sea lion rookeries, haulouts, and other critical habitat' (DeMaster and Fritz, 2001; Livingston, 2001 page 104-105). There is some evidence for this hypothesis reviewed in NRC (1996) and NMFS (2001a,d), but the evidence is either incomplete or inconsistent with other data. The recent NRC panel (Committee on the Alaska groundfish fishery and Steller sea lions, 2002) found that reduced prey availability could not be ruled out, but was a less likely hypothesis than others such as climate change or killer whale predation on SSLs. This lack of understanding makes it impossible to say what effect pollock fishing has on SSLCH.

The frequent alterations to past RPAs intended to reduce the impact of pollock fishing within SSLCH is consistent with this lack of knowledge. Scientific data evaluating the efficacy of each past RPA, or the most recent SPMs (Sea Lion Protection Measures) were lacking at the time of this report, and therefore it seems impossible to assess whether any one set of RPA or SPM conditions is more successful than another in mitigating impacts. Empirical evidence from catches taken within SSLCH shows that the various past RPAs have not significantly reduced the proportion of the pollock catch taken from SSLCH (see Figure 2.1).

The analysis of telemetry data by NMFS summarized in the addendum to the 2001 BiOp led NMFS to conclude that all of SSL critical habitat (0-20 nm) is not used equally. Instead, NMFS draws the conclusion that 0-3 nm and 3-10 nm are used significantly more than 10-20 nm, so that fishing inside SSLCH can be allowed using a zonal approach. However, this view was based on preliminary and incomplete analysis of new telemetry data and the scientific basis for this conclusion has not been subject to peer review.

Subsequently, NMFS has revised its interpretation of the telemetry data in the light of findings by Judge Zilly that 'NOAA Fisheries determination that the near shore zone of critical habitat (3nm to 10 nm) is 3 times more important to the foraging needs of Steller sea lions than the offshore critical habitat (10 nm to 20 nm) was not supported by the filtered telemetry data cited by NOAA Fisheries' (NMFS, 2003).

NOAA Fisheries did use "filtered" telemetry data in the 2001 Biological Opinion as well as in the Supplemental Analysis that the agency submitted to the Court on 19 June 2003 (the "Supplement"). The filtering technique utilized in the Supplement, however, was more refined than that utilized in the 2001 BiOp.

In the 2001 BiOp, the agency attempted to eliminate potential bias in the telemetry data by simply eliminating "90% of the locations which occurred between 0 and 2 nm from shore." This technique was designed as a precautionary method to minimize the possibility of overestimating "the dependence of juveniles and adult females on the inner 10 nm of critical habitat." But the choice of 90% elimination of data was arbitrary and that specific filter could not be justified. The Supplement used a different and somewhat more refined approach—one that was based on a new telemetry analysis that "integrat[ed] dive depth with locations". According to the Supplement, "[t]he new dive-related telemetry data identifies more specifically the mechanism that sea lions use to forage (i.e., diving)." (Supplement, p. 14). The restriction of analysis to devices that indicate diving behaviour will presumably remove much of the biased data from animals resting at haul-outs or sleeping rather than foraging. However, no validation of the depth selected to indicate 'foraging' was presented and this depth limit appears to be arbitrary and selected from the limited depth bins into which data are collected. It still seems uncertain how effective and reliable a filter this represents.

A further concern about the telemetry data that still remains after the new approach to filtering locations to reduce bias, is that much data from the PTTs comes from instruments deployed on SSL juveniles that may not be weaned , and so would have been remaining at rookeries or haul-outs to be fed by their mother. It is unlikely that the telemetry data can provide an accurate measure of how much SSLs feed within SSLCH, given that a high proportion of the data simply indicates that SSL pups waiting to be fed tend to stay close to home. This point is also made by NMFS when it states 'there has been a disproportionate number of pups instrumented vs. juveniles (2 and 3 year olds), which may bias the information on sea lion geographic distribution with data on animals that are still nursing and may not be foraging' and 'to date, researchers have inadequate telemetry information on animals from 2-4 years of age, the time period which may be crucial to their survival' (NMFS, 2003). The supplement reports on analyses completed in January and February 2003 "based on juvenile dive locations derived from satellite transmitters during the three-year period from 2000-2002." Pages 15-19 of the Supplement provide information derived from satellite dive recorders for 63 juvenile Steller sea lions. Of note, the analysis indicates that, "In summer, juvenile sea lions predominately use the 0-10 nm zone of critical habitat (88.9%)…In the winter the pattern is similar with 90.3% inside 0-10 nm, and 7% in 10-20 n.m." (See p. 18 of Supplement.)

Figure 2.1 (a). BSAI pollock catch in SSLCH 1991-2002 (from NMFS, 2003).

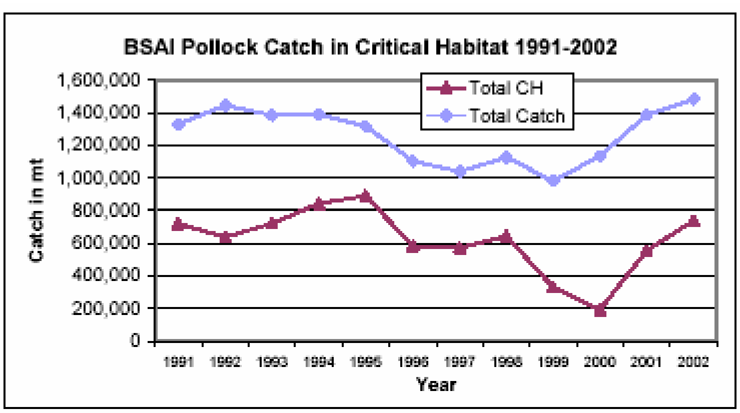
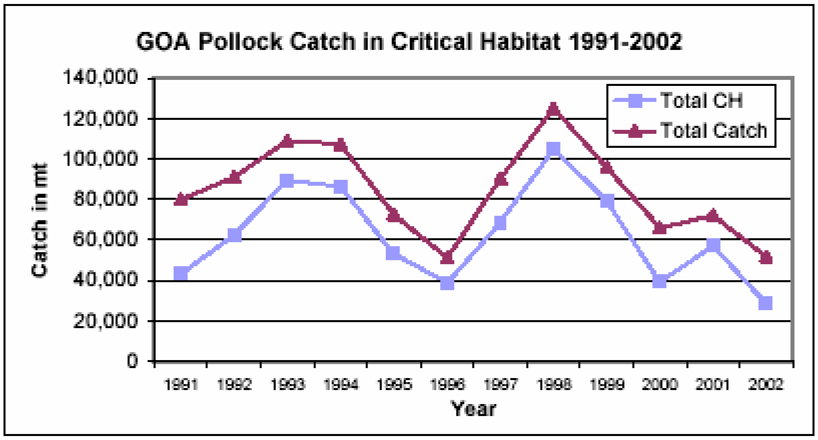


Figure 2.1 (b). GOA pollock catch in SSLCH 1991-2002 (from NMFS, 2003).



Judge Zilly also found that 'NMFS failed to adequately analyze the likely effects of fishing under the Steller sea lion protection measures on Steller sea lions, their prey, and their critical habitat. In this part of the Order, Judge Zilly concluded that even if NMFS had correctly evaluated the differing importance of the zones of critical habitat, the 2001 BiOp failed to evaluate "the differing effect of the current and proposed level of fishing on those zones of critical habitat and Steller sea lions." (NMFS, 2003).

Analyses of fishery patterns in 2002 indicate that the present RPA fishery mitigation plan allows catches in critical habitat to remain high or to rise to formerly high levels that existed prior to the determinations of jeopardy and adverse modification in the 1998 and 2000 biological opinions. (NMFS 2003 Supplement to the Supplemental October 2001 BiOp, pp. 23-24; Tables III-2,3,4,5,9; Figures III-1,2,3). Given that the competing hypotheses associated with availability of pollock in SSLCH cannot be sorted, the continued high harvest from SSLCH has attracted criticism from several environmental groups as being less precautionary than they consider appropriate, and provides a strong case for more and continued detailed research to test these hypotheses.
Apparently there is a lack of assessment of impacts of lost gear on habitat. According to the APA submission to the evaluation team (p16), 'no formal programs exist (sic!) at present to assess fishing gear loss and its concomitant direct and indirect effects on habitats in Alaska'.

Although rates of discarding from the pollock fisheries are low compared to those in many other fisheries (Alverson *et al.*, 1994), and can reasonably be assumed to have a negligible effect on benthic habitats and communities, the extent to which the provision of discards as a novel food supply for scavenging seabirds alters their habitat, behavior and spatial distribution, has apparently not been assessed in the GOA. While a discarding rate of only ca 1-2% of total catch is exemplary, this represented over 1,000 t of fish discarded each year 1998-2000 (Bernstein *et al.*, 2002, Table 8). This is not a trivial amount of food to be providing to scavenging marine animals. In other parts of the world, there is strong evidence that discards and offal provide an important food supply for a variety of species of scavenging seabirds (Furness *et al.*, 1992; Blaber *et al.*, 1995; Thompson and Riddy, 1995; Garthe *et al.*,

1996) and this feeding opportunity affects not only distributions of seabirds (Ryan and Moloney, 1988; Arcos and Oro, 1996; Freeman, 1997) but also their body condition (Hüppop and Wurm, 2000), breeding success (Oro *et al.*, 1995; Oro *et al.*, 1996a), contaminant accumulation (Arcos *et al.*, 2002), interspecific interactions (Heubeck *et al.*, 1999; Oro and Furness, 2002), population size (Oro *et al.*, 1996b; Chapdelaine and Rail, 1997) and demography (Furness, 2003). In the pSEIS and Ecosystem Considerations, these issues are discussed and it is evident that effects are being assessed by 'expert guesswork' rather than from a basis of scientific knowledge.

Condition

To improve the deficiencies in performance for this indicator, the fishery must improve assessments of impacts on habitats as follows:

1. Provide the certification body with information on ongoing research projects to determine the impact of pollock fishing, if any, on SSL critical habitat with particular emphasis on the effects of fishing, if any, on foraging sea lions.
2. Meet Condition 3.1 – thus provide a thorough written review of gear loss from pollock fishers and its impacts on habitats.
3. Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds. We require that the certification body be provided a summary of the current state of knowledge on the identified issue areas of concern and that targeted, clearly defined research programs be undertaken, if necessary, after consultation between the certification body and the fishery based on the findings of the written reviews.

Indicator 1.2.2. Assessments are conducted to identify and estimate impacts on invertebrate or vertebrate biodiversity and community structure.

The intention of this performance indicator is to evaluate the extent to which the fishery demonstrates that it does not have unacceptable impacts on biodiversity or structure of animal communities.

Elements considered in scoring include:

- The effects of the fishing on invertebrate and vertebrate biodiversity and community composition.
- The effects of bycatch and discards/discharges on invertebrate and vertebrate biodiversity and community composition.
- Information on the impact of lost fishing gear on fish and wildlife.
- Information on the discharge of processing wastes, and its effects on invertebrate and vertebrate communities and populations.

100 Scoring Guidepost

- Effects of trawling on benthic and pelagic animal communities, including changes in species abundance and composition, are measured at intervals on a programmatic basis.
- Impacts of the bycatch take on animal communities are measured at intervals on a programmatic basis.
- Impacts of pollock removal on populations and communities of lower trophic levels are measured at intervals on a programmatic basis.
- Effects of discards and waste discharges on invertebrate communities and populations are measured at intervals on a programmatic basis.
- Effects of discards and waste discharges on vertebrate communities and populations are measured at intervals on a programmatic basis.
- The impacts of lost gear on fish and wildlife are measured at intervals on a programmatic basis.
- This information is presented in documents that are made available to stakeholders.
- Responsive management changes in research priorities and needs occur as a direct result of assessment findings.

80 Scoring Guidepost

- Gear effects from trawling on benthic and pelagic animal communities, including changes in species abundance and composition, have been assessed.
- Impacts of bycatch on animal communities have been assessed.
- Impacts of pollock removal on populations and communities of lower trophic levels have been assessed.
- Effects of discards and waste discharges on invertebrate communities and populations have been assessed.
- Effects of discards and waste discharges on vertebrate communities and populations have been assessed.
- The impacts of lost gear on fish and wildlife have been assessed.
- These assessments have been made available to stakeholders.

60 Scoring Guidepost

- Adverse effects of trawling on animal communities, species and populations, are documented by sporadic investigations, but many of these are not in the public domain. Coverage of topics is incomplete. Quantitative estimation of impacts is therefore subject to much uncertainty.

SCORE: 90

Assessments have been made of most of these topics. The assessment of the impacts of fishery removals and bycatches on invertebrate and vertebrate communities in lower trophic levels is discussed in the draft pSEIS Section 3.9. However, several aspects remain unclear. The agency states that the impacts of the $F_{40\%}$ harvest policy on other components of the ecosystem are largely unknown (PSEIS VIII, F-1-19). NMFS says research is needed to assess ecosystem-level effects of single-species management for many of the target groundfish species (PSEIS IV, 5-16). The mechanisms and causal pathways for many potential food web effects are poorly documented because they are very difficult to study scientifically at sea (PSEIS I, 3.8-5). Presently, NMFS states it is not possible to fully and quantitatively account for all factors involved in determining how an ecosystem will respond to fishing activities (PSEIS VIII, F-3-33). But despite these areas of uncertainty, it is clear that the GOA communities have been the subject of more extensive research than is the case in most other major marine ecosystems.

Assessment of the effects of fishery removals and bycatches on lower trophic levels is also now a routine component of the ‘Ecosystem Considerations’ chapter of the GOA stock assessment analyses (Livingston 1999, 2000, 2001). The weighted trophic level of total fish and invertebrate catches in the GOA area has remained high and stable over the last 25 years, indicating that a ‘fishing down the food web’ effect is not occurring in the Alaska groundfish fisheries.

Impacts of changes in pollock removal on lower trophic level species were also assessed by Trites *et al.* (1999). Equilibrium biomass estimates for zooplankton with increasing fishing effort on pollock showed small increases for large zooplankton, virtually constant phytoplankton and herbivorous zooplankton biomasses, and increases in jellyfish.

Dynamic simulations showing the effects of removing adult pollock from the 1980s model ecosystem showed similar results (APA 2002; page 21). The assessments have been made available to stakeholders and many relevant reports are presented on the web, allowing easy access to the information.

Indicator 1.2.3. Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.

The intention of this performance indicator is to evaluate the extent to which a body of knowledge exists to permit the impacts of the fishery to be identified, and discriminated from impacts due to other factors such as natural variations in environmental conditions. This involves both a research plan and an implementation strategy.

100 Scoring Guidepost

- There is detailed information on mechanisms through which the fishery causes adverse effects on habitats.
- There is detailed information on mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.
- There is detailed information on mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.

- There is a coordinated research plan to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.
- The results of research findings are made directly available to management authorities and the public on a programmatic basis.

80 Scoring Guidepost

- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on habitats.
- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.
- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.
- A coordinated research plan is being developed to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.
- As research proceeds and new information is learned, it is made available to management authorities and the public in a timely manner.

60 Scoring Guidepost

- Research into the effects of the fishery on habitats, animal communities, populations, food webs, and ecological functional relationships is carried out in sporadic projects with little strategic planning or coordination. Results therefore provide only a weak basis for adjusting fishery management to reduce impacts.

SCORE: 79

There is a very considerable research effort into many aspects of the ecology of the GOA. This high quality research is internationally respected as of a very high quality, and much of the research is directly relevant to the position of pollock within the ecosystem and to interactions between the pollock fishery and ecosystem processes. Some aspects of Pacific ecosystem research are not only directly relevant but also outstanding science (for example the Resource Ecology and Ecosystem Modeling Task (REEM) located within REFM at NMFS AFSC, which provides a continuing research program aimed at understanding mechanisms through which the Alaska fisheries may cause adverse effects on vertebrate and invertebrate biodiversity, community structure and population dynamics).

Budgeting for research into key questions concerning the effects of the pollock fishery on the ecosystem seems weaker than might be expected knowing that a large fishery is occurring in and around the critical habitats occupied by an endangered species. While there is a research strategy, topics of highest importance in fishery-ecosystem impacts do not appear to receive adequate attention. Testing of key hypotheses have not been aggressively pursued in detail. For example there are many leading questions that continue to be unanswered such as, functional relationship between Steller sea lion foraging and pollock prey densities; the hypothesis that removal of Pollock from SSLCH has no effect on food availability to SSL.

The following are relevant quotations from the Supplement to the Endangered Species Act – Section 7 Consultation Biological Opinion and Incidental Take Statement of October 2001 (June 2003: pp 57-58).

"The analyses in the preceding sections of this biological opinion forms the basis for conclusions as to whether the proposed action, the ongoing fisheries for Pacific cod, Atka mackerel, and Pollock in the BSAI and GOA as modified by amendments 61/61 and 70/70 satisfy the standards of the ESA Section 7(a)(2)."

"The supplement further explores the rationale of the 2001 Biop, the telemetry information and the performance of the fisheries in relation to the requirement in order to remove jeopardy and adverse modification found in the FMP Biop. On the basis of this information and the analysis (2001 Biop and the supplement), NOAA Fisheries draws its conclusions about the effects of the pollock, Pacific cod, and Atka mackerel fisheries on the survival and recovery of the two listed populations of Steller sea lions."

"In this section NOAA Fisheries must determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed action, the environmental baseline, and cumulative effects. The information available to NOAA Fisheries is both quantitative and qualitative. For Steller sea lions, although significant research has been funded over the past few years and new information is being developed on the habitat requirements of the species, as well as various reviews (e.g., Bowen et al., 2001; NRC 2003) the cause of the current decline of the species is still unknown. NOAA Fisheries expects that over the next 3-5 years a significant amount of new information will be available for future decision making, however, much of the available data today is based on the professional judgment of knowledgeable scientists."

"After reviewing the current status of the endangered western population of Steller sea lions, the environmental baseline for the action area, the proposed action for Alaska Groundfish in the Bering Sea and Aleutian Islands and Gulf of Alaska, and the cumulative effects, it …. is not likely to jeopardize the continued existence of the western population of Steller sea lions."

The enormous increase in spending on SSL research for the past 2 years have occurred as a result of political negotiations rather than a sensible long-term research strategy. The fact that the set of RPA regulations have been altered on an almost annual basis means that it is very difficult to look at data sets for potentially impacted wildlife in relation to the management of the fishery, since impacts on population trajectories will likely be occurring over decadal scales.

Although many aspects of this Indicator exceed the 80 guidepost, these weaknesses in focus of research on key issues relating to the impact of pollock fishing lead us to score this Indicator below the 80 threshold.

Condition

To improve the deficiencies in performance for this indicator, research must be implemented to describe:

- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the regional scale related to stock size and stock geographical distribution;
- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling.
- Plans for these research projects will be sent to the SCS team for review, and then initiated no later than the following calendar year. Where research leads to new information relevant to management, appropriate changes in management will be required.

Indicator 1.2.4. There are monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats.

The intention of this performance indicator is to evaluate the suitability of monitoring programs that provide data on the impacts of the fishery on protected, endangered, threatened or icon species, and on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats. We appreciate that it is neither practical nor necessary to monitor every species of animal in the ecosystem, but we seek to explore whether monitoring is carried out for a suitable variety of animal taxa and community metrics in order to assess important impacts of the fishery.

100 Scoring Guidepost

- There is a monitoring program collecting empirical data on habitat metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on invertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on vertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on food-web and predator prey dynamics most liable to fishery impacts.
- Changes in research needs and priorities occur as a direct result of monitoring.

80 Scoring Guidepost

- A monitoring program is being established to collect empirical data on habitat metrics that are most liable to fishery impacts.
- A monitoring program is being established to collect empirical data on invertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- A monitoring program is being established to collect empirical data on vertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- A monitoring program is being developed to collect empirical data on food-web and predator prey dynamics most liable to fishery impacts.
- As monitoring proceeds, and new information is learned, responsive management actions occur.

60 Scoring Guidepost

- Monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats are only weakly developed and are very incomplete. Their outputs do not provide adequate information to set action thresholds for management responses to constrain fishery impacts within agreed and reasonable limits.

SCORE: 95

There are many monitoring programs that provide long-term data of relevance to investigating effects of the fishery on the wider ecosystem. Details of these programs are given in the APA submission (APA 2002; p35-42). Many of the programs are widely recognized internationally as of a very high standard. The score fails to achieve 100 because there is little evidence of research priorities being altered as a direct result of the findings of monitoring (bullet point 5 of the 100 guidepost). For example, there has been very little response in terms of fishery management or adjusted research priorities to test the hypothesis that increases in arrowtooth flounder populations are a response to removal of large (piscivorous) pollock from the food web, or that increases in jellyfish abundance are a response to reductions in abundance of planktivorous pollock.

Sc 1.3. As a consequence of research and monitoring during the development of the fishery, or use of spatial contrasts to infer impacts of fishing, there is now adequate knowledge of the ecosystem where the fishery operates, in relation to invertebrate and vertebrate communities in relevant habitats, and ecosystem structure.

The intent is to enable an evaluation of the extent to which sufficient knowledge of the ecosystem and of the natural functional relationships between species has been accumulated so that the fisheries management system can determine the nature of the effects of fishing on the ecosystem. This includes the extent to which there is a sufficient and appropriate process that operates to gather such knowledge.

This subcriterion is divided into three Indicators and these will be presented in turn: the first considers the adequacy of information on animal populations and productivity. The second considers the level of knowledge of animal communities in habitats likely to be affected by the fishery. The third considers the extent to which processes influencing animal populations and communities are understood.

Indicator 1.3.1. Abundance and/or productivity of animals have been monitored over time such that the fishery can be managed taking into account both natural and fishery impacts on animal abundance

The intention of this performance indicator is to assess the extent to which there is a body of knowledge available on the natural dynamics and productivity of animals that would permit perturbations caused by the fishery to be identified against a noisy background.

100 Scoring Guidepost

- Population abundances of invertebrates and vertebrates within the fishery area have been measured over a wide spatial scale and over many years so that densities, and variability in abundance are well known for the more abundant species and for species of particular conservation concern.
- Productivity of animal communities has been measured at a large number of locations across the geographical range of the fishery and in a large number of years.
- Spatial, and temporal, variations in productivity, and in trophic relationships have been measured.

80 Scoring Guidepost

- Studies of invertebrate and vertebrate population densities across the geographical range of the fishery are being carried out on species identified as being affected by fishing.
- Studies of trophic relationships, production, and spatial variations in animal abundance and productivity, are being carried out.

60 Scoring Guidepost

- Studies of animal population densities, trophic relationships, production and spatial variation in animal abundance have been carried out sporadically, such that the parameters that affect the natural dynamics of these processes are not understood well enough to identify important perturbations caused by the fishery against a noisy background of natural variations.

SCORE: 95

There are many research programs that provide data of relevance to investigating effects of the fishery on the wider ecosystem, and population abundances of many species are well known.

According to the stakeholder reports submitted to the evaluation team, the area is inhabited by more than 400 species of fish, along with mollusks, crustaceans, corals and other marine life ranging from micro-algae to migrating whales (Bernstein *et al.* 2002). Among these varied taxa, there are several strategic stocks of marine mammals and the distributions, abundances and population trends of these have been the focus of much study by NMFS and others (e.g. Kajimura and Loughlin, 1988; Baretta and Hunt, 1994; Cesarone and Withrow, 1999; Angliss *et al.*, 2001; DeMaster and Fritz, 2001; Huber *et al.*, 2001; Sease *et al.*, 2001; Committee on the Alaska groundfish fishery and Steller sea lions, 2002).

There are also data on productivity, including spatial and temporal patterns, and trophic relationships, for several of the key wildlife such as marine mammals and seabirds. For example, seabird breeding numbers, diet and productivity are reported in annual reviews for a large number of species and sites through Alaska (Dragoo *et al.*, 2000, 2001), as well as in specific research projects and particular colonies (e.g. Hunt *et al.*, 1996b) and at sea (e.g. Suryan *et al*., 2000; Hunt *et al.*, 2002a).

Information on populations of fish and invertebrates is less readily found, but this, together with the detailed data on marine mammals and seabirds, is synthesized each year in the 'Ecosystems Considerations chapter' which provides a detailed interpretation with particular regard to the fisheries interactions and potential management implications (Livingston, 1999, 2000, 2001). These detailed reviews provide an outstanding example of good practice within fisheries-ecosystem considerations.

The score of 95 reflects the excellence of the investigation of populations of animals. There are, of course, some limitations to the existing data sets. For example, long term trends in numbers of some potentially very important species, such as sharks and Orcas, are not well known.

Indicator 1.3.2. Communities of animals in the habitats likely to be affected by the fishery are known.

The intention of this performance indicator is to evaluate the extent of knowledge of animal communities in habitats thought to be vulnerable to impacts of the fishery.

100 Scoring Guidepost

- The distribution of habitats has been mapped over the geographical range of the fishery, with particular attention to the occurrence of habitats that are liable to be affected by fishing.
- Invertebrate, and vertebrate, community compositions have been measured for a large number of sites across the geographical range of the fishery and over a large number of years.

- Changes in habitat and animal distributions over time are measured.

80 Scoring Guidepost

- There is basic knowledge of the distributions of different types of habitat present across the geographical range of the fishery.
- There is basic knowledge of the distributions of invertebrate, and vertebrate, community compositions for most of these habitat types
- There is some general information about whether major changes in habitats and/or animal distribution patterns have occurred over time.

60 Scoring Guidepost

- Information on the distributions of habitats and the species of animals in these habitats is patchy and incomplete.

SCORE: 92

There is broad knowledge of the distributions of habitats and communities, and about major trends over time. This includes habitat maps and the composition of invertebrate and vertebrate communities measured at a large number of sites over a significant period of years. Various combinations of NMFS RACE-MACE-ABL and ADF&G research and resource-survey cruises have provided time series data on many of the common vertebrate and invertebrate communities. Furthermore, these survey data have been reviewed in the annual 'Ecosystems Consideration chapters' (Livingston, 1999, 2000, 2001) with particular attention on the implications of the observed patterns and changes for fishery management and conservation of the ecosystem. As with the consideration of animal populations and productivity (Indicator 1.3.1) the existence, and scientific quality, of the 'Ecosystems Consideration chapters' represents excellent practice.

Two aspects of community distribution and composition that have been examined in relatively little detail are the distribution of corals and the communities of zooplankton. Data on coral distribution and changes caused by fishing (primarily likely to be caused by demersal trawls and so not a major aspect in the context of the pollock fishery alone) would be valuable in identifying areas where protected status might be afforded to coral communities. Data on zooplankton community composition and abundance would be a valuable input to ecosystem models and as a means of testing hypotheses regarding causes of change in abundances of various fish and jellyfish, and the occurrences of 'regime shifts' and long term changes in oceanography.

The score of 92 reflects the strong performance on this indicator, with the slight reduction from 100 due to the relative weaknesses in knowledge of coral communities, and zooplankton communities. The score for GOA is lower on this indicator than for EBS/AI because there were indications that the GOA pollock fishery is somewhat more likely than the EBS/AI pollock fishery to have gear contact the benthos during fishing, though we appreciate that both fisheries are predominantly making midwater trawl catches.

Indicator 1.3.3. Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.

The intention of this performance indicator is to evaluate how well data collected under 1.3.1 and 1.3.2 have been compiled and reviewed to enable intelligent choices among management actions.

100 Scoring Guidepost

- There is sufficient understanding of the information collected on functional relationships between fisheries actions and responses of animal populations and communities such that management decisions can be made to mitigate effects from fishing.
- Information on changes in the status of animal populations and communities is provided in a timely fashion such that management decisions can be made, where appropriate, to mitigate the effects of fishing.

80 Scoring Guidepost

- At a minimum, estimates of empirical relationships between fisheries actions and responses of animal populations and communities have been made and provided to management for consideration in reducing the effects of fishing on animal species and communities and for informing research decisions.
- Where it seems to be appropriate, management decisions respond to changes in the status of animal populations and communities, on a precautionary basis.

60 Scoring Guidepost

- For species that have been identified as effected by fishing, there is insufficient knowledge to estimate spatial and temporal variations in abundances of animal populations and communities adequate to permit management decisions to be made in response to changes in the status of animal populations and communities.

SCORE: 75

Research on the functional relationships between predators and pollock abundance and/or distribution has largely failed to determine whether or not predator populations are being affected by the pollock fishery. Too little is known to determine whether changes in abundances of predatory fish such as arrowtooth flounder or of potential replacement species for planktivorous (smaller) pollock (e.g. jellyfish) are likely to be due to reductions in pollock biomass consequent on fishing.

Also, annual alterations in RPAs related to reducing impacts of the fishery on SSLCH appear to be rather arbitrary and based on inadequate scientific understanding to provide clear justification for actions taken. Nor have these measures been demonstrated to indeed mitigate putative impacts of the fishery on SSL. It is anticipated that this will change at the completion of the PSEIS if the management follows through on the information compiled and the results of the analyses.

The score assigned is primarily based on the fact that little is known of the relationships between pollock harvest and arrowtooth flounder and jellyfish population trends, but also on the fact that the RPAs for the GOA fishery have been rather unsuccessful in reducing the very high proportion of pollock harvest taken from within SSLCH (see Figure 2.1(b)), and the fact that the GOA TAC has tended to be set at the highest level permitted by the ABC in recent years when the stock has been decreasing to all time low levels, despite the fact that the impact of a stock so greatly reduced in abundance on the wider ecosystem (and especially on SSL) is largely a matter of speculation. In the latter context we recognize that several risk-aversion measures have been put in place for the 2002 and 2003 ABC setting process that have reduced the ABC for pollock and thus the GOA TACs.

According to the 2003 SAFE document for GOA pollock, "The elements of risk-aversion in this recommendation relative to using the point estimate of the model and the maximum permissible F-ABC are the following: 1) fixing trawl catch-ability at 1.0, 2) assuming an average 1999 year class instead of the model estimate, 3) not adjusting the 2002 Shelikof Strait survey biomass estimate despite evidence that the fraction of the stock spawning in Shelikof Strait was lower in 2002, 4) applying a more conservative harvest rate than the maximum permissible F-ABC. Collectively these risk-averse elements reduce the recommended ABC to less than 40% of the model point estimate." Therefore it is clear that the ABCs have been set conservatively in response to uncertainties in the GOA stock assessment data (which seem to have increased in recent years with the decline in stock biomass).

However, it may be useful to note that where studies have investigated responses of top predators to reductions in their food fish abundance, decreases of 70-80% in food fish stocks (i.e. approximately the situation currently existing with pollock in the GOA), have led to some dramatic reductions in predator densities or breeding performance. However, responses may vary considerably among species as a function of their vulnerability resulting from aspects of the individual species' ecology. For example, black-legged kittiwakes, parasitic jaegers and terns at Shetland, U.K., showed almost total breeding failure in years when sandeel abundance was around 20% of 'normal' (Phillips *et al.*, 1996; Furness and Tasker, 2000) but the breeding of some other seabird species was almost unaffected as they were able to compensate by behavioral means. Similarly, in the case of the decline in abundance of capelin in the Barents Sea in the 1980-90s a population crash affected common murres as a result of winter starvation (Vader *et al.*, 1990; Barrett and Krasnov, 1996) but did not affect some other species.

These examples suggest that a 70-80% decline in pollock abundance in the GOA may be expected to affect foraging top predators that are sensitive to food availability. Although the sensitivity of the Steller sea lion to prey field reduction is not known, the fact that SSL has an energetically expensive mode of foraging, and carries little fat reserves, would tend to suggest that sea lions will be more sensitive to reduced prey availability than some other species.

Condition

To improve the deficiencies in performance for this indicator, the fishery must provide the SCS team with information on ecosystem modeling being carried out to investigate whether increases in jellyfish or Arrowtooth flounder are likely to be due to reductions in pollock biomass consequent on fishing.

Concerns regarding the relationship between the pollock fisheries and SSL are dealt with under Indicator 2.3.1.

MSC Criterion 2

The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.

Our interpretation of MSC Criterion 2. There is a well-defined and effective strategy to ensure that ecological impacts of the fishery are monitored, and restrained to minimize impacts on endangered, threatened, protected or icon species (we define icon species as any species of particular public interest that does not qualify under the terms ‘endangered, threatened, or protected’). These impacts may be identified at the genetic, population, or community level.

Criterion 2 is divided initially into four components. 2.1 is a stand-alone Indicator, 2.2 is a subcriterion split into 2 Indicators, 2.3 is a subcriterion split into 4 Indicators, and 2.4 is a subcriterion split into 3 Indicators.

Indicator 2.1. The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.

100 Scoring Guidepost

- An ecological risk assessment has been conducted, based on knowledge of functional relationships, to determine the potential impacts of the fishery on the genetic, species and population level biodiversity endangered, threatened or protected species. Fishery management is constrained to minimize impacts on the basis of this risk assessment. Impacts are held below levels that would be unacceptable.

80 Scoring Guidepost

- An assessment has been conducted to estimate the potential impacts of the fishery on the genetic, species and population level biodiversity for endangered, threatened or protected species. Fisheries management has shown itself to be responsive to this risk assessment and attempts to minimize impacts.

60 Scoring Guidepost

- There is inadequate knowledge of endangered, threatened or protected species such that important impacts of the fishery on their biodiversity cannot be identified and it is impossible to adjust management to confidently expect reductions in these impacts.

SCORE 79

According to stakeholder reports submitted to the evaluation team (Bernstein *et al.*, 2002), 'bycatch reduction and monitoring programs are effective. But bycatch reporting could be improved'. However, the main reason why the GOA pollock fisheries fell below the 80 guidepost derives from the fact that the impact of the fisheries on protected pollock predators is largely unknown. In the presence of this uncertainty, given the general lack of knowledge as to whether pollock fishing affects populations of pollock predators (especially Steller sea lions, harbor seals) a precautionary approach to fishery management would be expected. There is little evidence of precaution to avoid possible impacts on harbor seals despite some evidence suggesting an impact. RPAs have been rather ineffective in reducing harvest of pollock from SSLCH, and there does not appear to be a systematic approach to understanding or mitigating effects on other protected species such as harbor seals. In the absence of a better understanding about the effects of the fishery on these species, a more precautionary approach to constraining harvest from critical areas for predators would seem warranted. Setting TAC below the ABC is one way to be precautionary, but empirical evidence from these fisheries is that the TAC is only set significantly below the ABC when the stock size is exceptionally large (so that precaution is not a key issue). Another way to be precautionary would be to set ABCs using an approach that better incorporates ecosystem considerations.

Condition

To improve the deficiencies in performance for this indicator, the fishery must:

- Adjust management as described in the Conditions under Indicator 1.1.
- Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.

Subcriterion 2.2 Management of the fishery takes account of the need to constrain impacts on protected species

Indicator 2.2.1. The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act

100 Scoring Guidepost

- There is a detailed management plan that includes ecosystem considerations based on the functional relationships between the fishery and endangered, threatened, protected or icon species.
- This forms the basis for a fishery management strategy that restrains impacts on endangered, threatened, protected or icon species within defined bounds.
- These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high.

80 Scoring Guidepost

- There is a management strategy with consideration for ecological impacts on endangered, threatened, protected and icon species.
- This assists fishery management to adjust to reduce impacts on endangered, threatened, protected or icon species.
- Where uncertainty is high, management to restrain impacts is precautionary.

60 Scoring Guidepost

- Ecosystem aspects of management are treated as minor, 'bolt-on' aspects of the management system of the fishery, which is essentially single-species target stock management, adapted where necessary to comply with other legislation.

SCORE: 75

This fishery falls close to the 80 guidepost, as there is a management strategy with consideration for ecological impacts on endangered, threatened, and protected species. Management has adjusted very effectively to reduce impacts caused by bycatch, and to some extent has taken steps to reduce entanglement issues. However, the score given falls slightly below 80, primarily because the indirect impacts of the fishery are very little understood, and in the presence of major uncertainty about the effects on these species the management does not fully meet the requirement to be precautionary.

In the context of the pollock fisheries in the GOA, the focus within this indicator falls on the relationship with the declining species the Steller sea lion, classified under U.S. law as an Endangered Species. This brings into play legal requirements to act to protect the population, although numbers continue to fall in the main range of the species where interactions with the pollock fishery may be occurring.

We have already discussed the fact that 'Ecosystem Considerations' are not generally incorporated into the ABC setting process. In passing we note that in the GOA, the TAC has usually not been reduced below the ABC when stock has fallen (so potentially reduces food for pollock predators), and indeed the % exploitation rate has increased in many recent years when stock has been smallest (though it was reduced in 2002 and 2003 due to higher uncertainties over stock assessment data and consequent precautionary setting of the ABCs). Therefore when the stock has been smaller, the TAC has been set on a single-species basis as high as the ABC would permit, yet this is the very time when a more precautionary TAC reduced in the light of ecosystem concerns might have been appropriate.

In the context of impacts on Steller sea lions, the Sea Lion Protection Measures (SPMs) adopted by the NPFMC represent the main management tool intended to avoid impacts rather than limitations on ABCs or TACs (unless the stock falls to below 20% of unfished biomass in which case the fishery closes to avoid further depletion but this limit has not yet been reached in either the EBS or GOA pollock fisheries, although the GOA pollock stock has fallen to close to this threshold). The management strategy sets 'Reasonable and Prudent Alternatives' (SPMs) intended to constrain any impact of pollock fishing on Steller sea lions.

Nevertheless, these actions in recent years have not stopped the fishery from taking a high proportion of pollock from areas within defined 'Critical Habitat' of Steller sea lions.

Also, there is little evidence of monitoring programs designed to test the efficacy of any implemented SPMs (see Condition for Indicator 2.3.1). The evaluation team is left having to conclude that the measures introduced to mitigate effects on SSLs may, or may not, reduce the impact, if any, from pollock fishing. Given that the impact of pollock fishing on Steller sea lions is still not well understood, and the absence of any clear scientific understanding of the consequences of SPMs, it does not appear that the management is taking a systematic approach to being precautionary.

Condition

With regard to Steller sea lions (SSLs), current management measures regulating fishing in SSL critical habitat were developed, in large part, based on satellite telemetry data collected to define important SSL foraging areas. To improve the deficiencies in performance for this indicator, the team calls for rigorous peer review of the telemetry data analysis given the significant role of the telemetry data in setting the regulatory regime. Given these considerations, the evaluation team sets for the following conditions:

- The analysis of the satellite telemetry data and results used to justify the 2001 BiOp should be subject to external peer review and the results of such review shall be available to the certifier within 6 months of issuance of the certificate for the GOA fishery. NMFS should submit the telemetry data analysis to the Center of Independent Experts (CIE). The University of Miami's CIE administers a review process, drawing from a formal pool of qualified scientific experts, ensuring the selection of a panel free from the influence of either NMFS or other groups with a vested interest in the review's findings. It is very important that the panel should

contain 2 or members with expertise in the analysis of PTT data from marine vertebrates.
- The management system should consider the input received from the CIE review and act appropriately.

Indicator 2.2.2. Management of the fishery includes provisions for acquiring, integrating and synthesizing new scientific information from protected species research, management and recovery programs outside fishery management.

100 Scoring Guidepost

- The management system fully recognizes applicable legislative and institutional responsibilities outside fishery management regarding protected species.
- The management system has established mechanisms to conduct integrated and synthetic environmental assessment.
- Relevant data from protected species research, management and recovery programs are integrated into the fishery management system to inform policy.

80 Scoring Guidepost

- The management system recognizes applicable legislative and institutional responsibilities outside fishery management regarding protected species.

60 Scoring Guidepost

- The management system is reactive rather than proactive.

SCORE: 95

There is a very high quality scientific review of available data by NMFS, which is evident in outputs such as the ‘Ecosystems Considerations’ chapters (Livingston 1999, 2000, 2001) and the many specific outputs from the Marine Mammal researchers at NMFS and elsewhere. This is highly commendable. This information is presented to management at the Plan Team, SSC and North Pacific Fishery Council levels. However, the link between scientific review of issues and integration of this information into the management process has not yet been developed in a way that permits these wider ecosystem issues to be fully incorporated into the management process. We can conclude that the management system fully recognizes institutional responsibilities regarding protected species, and has established mechanisms to conduct integrated and synthetic environmental assessment. Relevant data from protected species research, management and recovery programs inform policy, but are not necessarily fully integrated into the fishery management system.

Sc 2.3. Research is being carried out to measure impacts of the fishery on endangered, threatened or protected species.

The intent is to enable an evaluation of the extent to which there are robust assessments or predictions of impacts of the fishery, and monitoring of the populations considered likely to be affected such that any impacts are likely to be identified. Such assessments require not only relevant monitoring data but also procedures for the measurement of impacts in the context of natural variations.

Subcriterion 2.3 is divided into four separate Indicators.

Indicator 2.3.1. Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.

The intention of this performance indicator is to evaluate the extent to which the fishery can demonstrate that it does not have unacceptable impacts on protected, endangered, threatened or icon species, and particularly those identified for protection under United States legislation.

Elements considered in scoring include:

- Information on the direct interactions of the fishery with protected, endangered, threatened or icon species, such as through by-catch, entanglement with lost fishing gear, effects on behavior, or physical disruption of seabird and sea mammal populations is available, and management strategies have put in place systems to reduce direct impacts to minimum levels.
- Information on the indirect interactions of the fishery with protected, endangered, threatened or icon species, such as through alterations to their foraging opportunities, is available, and management strategies have put in place systems to reduce indirect impacts to minimum levels.
- Levels of impacts on protected, endangered, threatened or icon species do not have detrimental effects on their populations.

100 Scoring Guidepost

- Direct and indirect impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size (defined as causing a significant decrease in population size or a significant risk of local extinction).

80 Scoring Guidepost

- Direct impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size.
- Indirect impacts of fishing (including food competition, changes in foraging behavior, disruption to animals and prey fields) on all protected, endangered, threatened and icon species have been examined and the evidence suggests that these impacts are below levels that harm population size.
- Research needed to measure indirect impacts of fishing on all protected, endangered, threatened and icon species is being carried out.

60 Scoring Guidepost

- Knowledge of direct and indirect impacts of the fishery on protected, endangered, threatened and icon species is fragmented, incomplete and inadequate to permit management to develop methods to limit these impacts to within agreed and reasonable bounds. Research being carried out is not adequately focused to provide the missing information.

SCORE: 79

Direct impacts of the fishery are generally well known, monitored, and mostly held at levels that do not harm populations (National Marine Fisheries Service, 2001a). Some concern was expressed by the recent NRC review panel that entanglement might be contributing significantly to the decline of the Steller sea lion, suggesting that further assessment of that hypothesis is required (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002).

Indirect impacts are even more difficult to assess. An experimental approach would be required to test the key hypothesis that Steller sea lion foraging is affected by harvest of pollock from SSL critical habitat. Although such an approach has been proposed by NMFS, it has not yet been carried out. In the absence of conclusions from research into the effects of the fishery on prey fields for dependent predators such as Steller sea lion, management cannot take these interactions into account except by precautionary limits to the fishery.

Condition

To improve the deficiencies in performance for this indicator, the fishery must design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on SSL behavior, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002) recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. We support the goals and objectives of the NRC's prescribed action, but appreciate that it would be inappropriate to suggest increasing pollock fishing intensity to levels that increase jeopardy (in the legal sense) to SSL populations and that there are complex scientific and legal issues involved. Therefore, it will be necessary to design this experiment in such a way that comparison can be made between areas where fishing intensity is reduced with areas where it is maintained at levels comparable to those in the recent past (but perhaps within this limit still increased by as much as the decrease in harvest lost to industry from reduced fishing areas). The hypothesis to test would then be that SSL numbers or productivity in reduced fishing areas would show a positive deviation relative to values in fished areas, and the null hypothesis that performance of SSL would be no different between areas. Such an experiment should be underway no later than 2006.

Indicator 2.3.2. Permitted take levels for endangered and threatened species, and threshold levels of unacceptable impact have been identified for protected or icon species in fished areas and the fishery is managed in accordance with national and/or international laws on endangered and threatened species. Threshold levels of unacceptable impact have been identified for habitats in fished areas.

The intention of this performance indicator is to evaluate the extent to which appropriate reference levels have been set for fishery impacts on animals and habitats.

100 Scoring Guidepost

- Permitted take levels for endangered and threatened species, and threshold levels of unacceptable take of protected and icon species have been set at levels that can be expected to keep impact well below levels that would harm population size and are in accordance with international and/or national laws.

80 Scoring Guidepost

- Permitted take levels for endangered and threatened species have been set at levels that can be expected to keep impact well below levels that harm population size and are in accordance with international and/or national laws
- Threshold levels of unacceptable take of protected and icon species have been set at levels that can be expected to keep impact below levels that harm population size.

60 Scoring Guidepost

- Permitted take levels for endangered and threatened species, or threshold levels of unacceptable take for protected and icon species are set at levels that may still permit damaging impacts on these populations to continue, because they are not sufficiently precautionary in relation to high levels of uncertainty in the fishery or animal population dynamics.

SCORE: 95

The pSEIS (2.9-18) (National Marine Fisheries Service, 2001a) indicates that take levels are low and do not reach values that would be regarded as harming population size. As a mid-water trawl fishery, impacts on benthic habitats are considered to be very slight (National Marine Fisheries Service 2001a; APA, 2002). The score should therefore be close to 100. Since there is some uncertainty as to whether the fishery may impact on essential fish habitat in terms of pollock spawning aggregations (National Marine Fisheries Service 2002a), we gave a score of 95 rather than any higher.

Indicator 2.3.3. Research is carried out to allow impacts of the fishery on endangered, threatened, protected and icon species to be identified and measured.

The intention of this performance indicator is to evaluate the extent to which a body of knowledge exists to permit the impacts of the fishery to be identified, and discriminated from impacts due to other factors such as natural variations in environmental conditions.

100 Scoring Guidepost

- There is a regular and continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on endangered, threatened, protected and icon species, not only considering direct take issues, but also indirect effects on food availability, foraging behavior, disturbance, etc.

80 Scoring Guidepost

- The research program is developing into a regular and continuing effort to determine mechanisms through which the fishery causes adverse effects on endangered, threatened, protected and icon species, not only considering direct take issues, but also indirect effects on food availability, foraging behavior, disturbance, etc.

60 Scoring Guidepost

- The existing research program may contribute to a better understanding of the relationships between the fishery and endangered, threatened, protected and icon species, but is not sufficiently focused on the functional relationships that need to be understood in order to permit significant improvements to management.

SCORE: 79

Conditionally significant adverse effects of the pollock fishery have been identified as impacting SSLs and harbor seals, although these adverse effects 'concern simply the plausibility of presumed competition for prey resources and-or disturbance. That is to say, the evidence to date for these adverse indirect effects is almost entirely circumstantial, with essentially no direct data or analyses available which bear directly on the mechanisms assumed to represent the effects of fishing on prey availability' (APA 2002; p84).

While this statement can be (correctly) taken to mean that effects of the fishery on these animals are unclear, it is also the case that this demonstrates that there has been a failure to collect the necessary data to test the hypotheses concerned or to carry out critical analyses of data sets that may provide this information. Indeed, previous research has failed to discriminate between multiple hypotheses erected to 'explain' the decline of the Steller sea lion (Bowen *et al.*, 2001; Committee on the Alaska Groundfish Fishery and Steller Sea Lions, 2002). Current research may do so, and the huge expansion in Steller sea lion research funding, indicates a strong desire to solve this key question.

Analysis of the rates of decline of numbers of SSLs at individual haul-out sites and rookeries, has begun to provide statistically robust indications of the roles of food abundance and other factors (Marc Mangel, paper presented to Symposium of the Zoological Society of London, 22-23 April 2004). These promising results seem likely to provide a significant step forward in understanding SSL population trajectories and ecological relationships.

Functional relationships between other animals and the pollock fishery (e.g. harbor seals, seabirds) have received even less attention than for Steller sea lion.

NMFS (2003) describe the latest information on the experiment being carried out near Kodiak Island to investigate whether commercial fishing for pollock causes changes in spatial patterns and abundance at scales relevant to foraging sea lions and which apparently has not used methodologies or equipment capable of answering this question. They concluded 'the high degree of variability between passes, precluded detection of a fishing effect. However, when biomass estimates were averaged before and during the fishery, there appeared to be a decline that would be consistent with observed fishery removals… estimate of pollock biomass went from 12,700 mt to 4,800 mt, which calls into question the ability of this technology to detect localized depletions of prey, or other changes which may influence the foraging success of Steller sea lions'.

Given the present lack of information on the effect of the fishery on prey fields, and lack of information on the prey field required by predators for economic foraging, management of catches in 'critical habitat' cannot take a scientific approach to setting acceptable levels of harvest from critical habitat.

Condition

Same as in Indicator 2.3.1.

Indicator 2.3.4. There are monitoring programs to assess fishery impacts on endangered, threatened, protected or icon species that have been identified as vulnerable to fishing impacts.

The intention of this performance indicator is to evaluate the suitability of monitoring programs that provide data on the impacts of the fishery on protected, endangered, threatened or icon species.

100 Scoring Guidepost

- Population sizes and demography of endangered, threatened, protected and icon species that are vulnerable to fishery impacts are monitored to the level that will permit impacts of the fishery to be measured and trends reported.

80 Scoring Guidepost

- Population sizes and demography of protected and icon species that are vulnerable to fishery impacts are monitored, but with varying levels of effectiveness in different locations and not necessarily following standardized protocols.

- Information necessary to properly manage the fishery to comply with existing laws on endangered and threatened species is being collected.

60 Scoring Guidepost

- Monitoring programs exist, but are inadequate and/or incomplete.

SCORE: 95

Species that may be considered most vulnerable to the GOA pollock fisheries include the western stock of SSLs, harbor seals, Pacific sleeper and salmon sharks. Population sizes and demography of these species are monitored. Bycatch of salmon sharks and Pacific sleeper sharks is accurately monitored via the NPGOP. Trends in the absolute biomass of salmon sharks and Pacific sleeper sharks within the GOA are not available. However, minimum abundance estimates and relative indices of abundance are available from bottom-trawl and long-line surveys.

The NMML Alaska Ecosystems Program is responsible for research and monitoring of SSL populations. For SSLs, monitoring is focused on ‘trend sites’ which are those rookeries and haul-outs surveyed consistently from the 1970s to the present. The NMML and ADF&G cooperate in the census of Alaska SSLs, and non-pups are typically counted via aerial surveys, using standardized methodology.

State and federal biologists have been collecting harbor seal count data sporadically since the 1940s, but this has developed into a more standardized program since the 1970s.

Thus this indicator reaches well above the 80 guidepost, and closer to the 100 guidepost.

Sc 2.4. There are data sets and knowledge of the ecosystem sufficient to measure impacts of the fishery on protected, endangered, threatened or icon species.

The intent is to enable an evaluation of the extent to which there is sufficient knowledge of the natural functional relationships between species so that the fisheries management system can determine the nature of the effects of fishing on the species of concern. This includes the extent to which there is a sufficient and appropriate process that operates to gather such knowledge.

This subcriterion is divided into three separate Indicators.

Indicator 2.4.1. Functional relationships involving endangered, threatened, protected or icon species are adequately understood for the purposes of minimizing the fishery’s impacts on such species.

The intention of this performance indicator is to assess the state of knowledge of the functional relationships that determine the dynamics of endangered, threatened, protected or icon species, as a prerequisite to assessing the mechanisms by which these processes may be altered by the fishery. The species of interest here include all marine mammals, sea turtles and seabirds.

100 Scoring Guidepost

- Knowledge of relevant species' ecology is sufficient to allow functional relationships of endangered, threatened, protected and icon species to be described, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.

80 Scoring Guidepost

- There is basic knowledge of the ecology of endangered, threatened, protected and icon species in the fishery area.
- Research is being conducted to determine the functional relationships of endangered, threatened, protected and icon species, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.
- A research plan/strategy is in place to ensure that the research being conducted is continued until there is an understanding about the functional relationships of endangered, threatened, protected and icon species, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.

60 Scoring Guidepost

- Too little is known about the functional relationships between endangered, threatened, protected and icon species and the fishery to permit the fishery impacts on such species to be significantly reduced by alterations in fishery management, and there is insufficient effort to promote and conduct research that will lead to better management of the situation.

SCORE: 80

There is basic knowledge of the ecology of endangered, threatened, protected and icon species in the fishery area. Research is being conducted to try to get an understanding of the relationships between these animals and the Pollock fishery, but functional relationships remain largely a matter of speculation due to the lack of research directed specifically to answer this key question.

Conditionally significant adverse effects of the pollock fishery have been identified as impacting SSLs and harbor seals, although in each case these adverse effects 'concern simply the plausibility of presumed competition for prey resources and-or disturbance. That is to say, the evidence to date for these adverse indirect effects is almost entirely circumstantial, with essentially no direct data or analyses available which bear directly on the mechanisms assumed to represent the effects of fishing on prey availability' (APA 2002; p84).

There are, however, many research projects now being undertaken that may eventually shed light on these questions, following a research strategy coordinated by NMFS. Recent analysis by Marc Mangel of SSL numerical trends at individual haul-out sites and rookeries seems an especially good approach to appraising the roles of factors such as food fish abundance, fisheries and predation impact on SSL demography (see also text under Indicator 2.3.3).

Indicator 2.4.2. Trophic (predator-prey) relationships, especially those involving endangered, threatened, protected or icon species, are adequately understood for the purposes of minimizing the fishery's impacts on such trophic relationships.

The intention of this performance indicator is to evaluate the extent of knowledge of dietary habits of animals, especially endangered, threatened, protected or icon species, that may be affected by the fishery altering food availability. The species of interest here include all marine mammals, certain sharks, sea turtles and seabirds.

100 Scoring Guidepost

- Diets and foraging requirements of important animals in the food webs, especially endangered, threatened, protected, and icon species are well known.

80 Scoring Guidepost

- There is a basic understanding of the diets and foraging behavior of important animals in the food web, especially endangered, threatened, protected and icon species.
- Further research on this topic is being carried out, especially with respect to species thought to be vulnerable to indirect impacts from the fishery.

60 Scoring Guidepost

- Too little is known about the trophic relationships, diets and feeding ecology of endangered, threatened, protected and icon species to permit the fishery impacts on such species to be significantly reduced by alterations in fishery management, and there is insufficient effort to promote and conduct research that will lead to better management of the situation.

SCORE: 90

Diets of important animals are generally well known within the constraints usually arising in such studies (e.g. difficulties of sampling at certain times of year). There is a basic understanding of the foraging behavior of many of the important animals in the food web, especially endangered, threatened, protected and icon species. Further research on this topic is being carried out, especially with respect to species thought to be vulnerable to indirect impacts from the fishery. Thus the amount of dietary information is satisfactory for input into food web bioenergetics models (Bax, 1991; Livingston, 1993; Hollowed, Bax *et al.*, 2000; Hollowed, Ianelli *et al.*, 2000; Livingston and Jurado-Molina, 2000).

There have also been significant developments of studies quantifying diets of particular 'top predators' (Sinclair *et al.*, 1994; Decker *et al.*, 1995; Decker and Hunt, 1996; Hunt *et al.*, 1996, 2002; Merrick and Loughlin, 1997; Merrick *et al.*, 1997; Yang and Page, 1998; Dragoo *et al.*, 2000, 2001; Lang *et al.*, 2000; Laake *et al.*, 2002; Winship *et al.*, 2002) or developing diet study methodology for particular predator species (Cottrell and Trites, 2002), or using indirect measures of diet such as fatty acid signatures (Iverson *et al.*, 1997; 2002) and stable isotope ratios (Hobson *et al.*, 1997; Burton and Koch, 1999; Kurle, 2002, Kurle and Worthy, 2001, 2002).

Despite the existence of much data on diets and trophic relations, there are species that may be important within the food web yet their diet remains only poorly known. For example, the extent to which Orcas feed on SSL is a question that may be important in understanding causes of SSL population decline.

Indicator 2.4.3. Population sizes and population trends of endangered, threatened, protected or icon species are adequately known, together with the nature and distributions of their essential habitats.

The intention of this performance indicator is to evaluate the extent of knowledge of population sizes and population trends of animals thought to be vulnerable to impacts of the fishery. The species of interest here include all marine mammals, certain sharks, sea turtles and seabirds.

100 Scoring Guidepost

- There are reliable and up-to-date data on total population sizes, locations of breeding sites, numbers breeding at each site, and also on the spatial distributions of animals outside the breeding season, for all species of animals thought to be vulnerable to impacts of the fishery.
- Population trends, especially trends in breeding numbers and in breeding productivity, are known over a period of years relevant to the duration and scale of the fishery.
- Population estimates and trends are known for a period prior to when the fishery began operating, or when the fishery was small enough to have negligible impact on these parameters.
- Where the occurrence of fishery impacts on a particular animal species is uncertain, the animal species is included in the list in order to be precautionary.

80 Scoring Guidepost

- The presence and distributions of endangered, threatened, protected and icon species in the area of the fishery are known.
- There is knowledge of the major species and their habitats in the area of the fishery, and relevant aspects of their spatial and seasonal distributions.

- Research is being undertaken as part of an overall research plan or strategy to add to the existing basic knowledge of numbers, distribution, demography and population trends.

60 Scoring Guidepost

- Information on habitats, numbers, distributions and population trends of endangered, threatened, protected and icon species in the area of the fishery are at best vaguely known.

SCORE: 90

The presence and distributions of endangered, threatened, protected and icon species in the area of the fishery are known. There is knowledge of the major species and their habitats in the area of the fishery, and relevant aspects of their spatial and seasonal distributions. Research is being undertaken as part of an overall research plan or strategy to add to the existing basic knowledge of numbers, distribution, demography and population trends.

The pollock fisheries do not achieve 100 on this Indicator for a number of reasons. Firstly, because data on the absolute abundance of sharks are not available. Secondly, because there are some difficulties in the interpretation of population trends in harbor seals as a result of limitations in the survey effort and hence in the confidence intervals on specific population estimates. Thirdly, because the nature and distribution of essential habitat is not well known for most species (this last point is an explicit component in the Indicator title although not clearly listed in the scoring guideposts). The distribution of Steller sea lion critical habitat (SSLCH) has been defined, and is an important aspect of management to avoid impacts of the pollock fishery on SSL pollock prey fields, but the foraging distributions of Stellers sea lions are as yet only poorly known and somewhat confounded by the recent premature attempts to use satellite tracking data of sea lion distributions to infer where the animals forage on the (unlikely) assumption that where animals rest maps closely onto where they feed.

MSC Criterion 3

Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

Our interpretation: We interpret this criterion to be considering the question whether populations of animals that have been reduced in abundance over time by past actions of the fishery are now being enabled to recover through alterations in the management of the fishery that promote their recovery and rebuilding. We take ‘exploited populations’ to mean ‘impacted populations of species other than the fishery target species since Principle 2 is directed at aspects of the ecosystem beyond the maintenance of the target stock (which is dealt with in Principle 1).

We are therefore looking to see if there is a well-defined and effective strategy to ensure that ecological impacts of the fishery would be restrained to permit recovery and rebuilding of populations of impacted species that had been depleted by previous actions of this fishery.

This Criterion is divided into three Indicators.

Indicator 3.1. Management strategies include provision for restrictions to the fishery to enable recovery of populations of impacted species that have been depleted by previous actions of this fishery.

100 Scoring Guidepost

- The ecosystem components of the management plan include mechanisms to reduce fishing in locations or ways that remove impacts on depleted species to the extent necessary to permit the impacted species' populations to recover and rebuild.

80 Scoring Guidepost

- The ecosystem components of the management plan are being improved to provide a framework for decisions about ways to modify fishing to reduce impacts on depleted species, to allow them to recover and rebuild.

60 Scoring Guidepost

- Management takes account of statutory requirements to protect endangered and threatened species but contains little or no provision for recovery of populations of other impacted species that do not enjoy ESA protection.

SCORE: 80

Depleted species include some stocks of herring, salmon and crabs, Steller sea lions and possibly harbor seals. The MMAP was developed to manage incidental mortality of marine mammals in fisheries, and provides NMFS with authority to place observers on vessels to assess marine mammal bycatch. Management has been responsive to the need to minimize marine mammal bycatch, and the pollock fishery meets standards set for this. However, the various RPA actions to reduce impact of the pollock fishery on Steller sea lion prey fields have been based on little scientific knowledge of either the critical habitat for foraging Steller sea lions or on the impact of fishing on pollock prey fields within SSLCH. Therefore the RPAs have been somewhat arbitrary. These have also not been evaluated, and so it is impossible to say with any confidence that the RPAs have been beneficial to Steller sea lion recovery. Therefore, on balance, the 80 scoring guidepost seems to describe the situation well for the Gulf of Alaska.

Indicator 3.2. Changes in management have been implemented in order to recover affected communities of animals, habitats, or populations of impacted species that are believed to have been depleted by previous actions of this fishery.

100 Scoring Guidepost

- Where there is evidence of depletion of animal communities, damage to habitats or depletion of populations (endangered, threatened, protected and icon species, or species recognized by leading scientific information as key component to ecosystem sustainability in the area of the fishery) the fishery management has been altered in a timely manner to reduce the impact to a level that results in recovery and rebuilding of affected populations.

80 Scoring Guidepost

- Management responds in a timely manner by altering fishery regulations and practice in ways that are thought to reduce impacts to an extent that should lead to population recovery and rebuilding of species (endangered, threatened, protected and icon species, or species recognized by leading scientific information as key component to ecosystem sustainability in the area of the fishery).
- A monitoring program is put in place to assess whether or not management measures are effective.

60 Scoring Guidepost

- Management responds to reduce impacts on endangered and threatened species but it is unclear whether changes are adequate to achieve recovery and rebuilding.

SCORE: 79

Responses to declines in populations of Steller sea lions have not been timely. Despite prolonged declines in populations of these mammals in the GOA, responses to the Steller sea lion decline have been made in a somewhat erratic and inconsistent way, with little assessment of the outcome and efficacy of the changes introduced. In essence, the various RPA actions to reduce impact of the pollock fishery on Steller sea lion prey fields have been based on little scientific knowledge of either the critical habitat for foraging Steller sea lions or on the impact of fishing on pollock prey fields within SSLCH. Therefore the RPAs have been somewhat arbitrary. These have also not been evaluated, and so it is impossible to say with any confidence that the RPAs have been beneficial to Steller sea lion recovery.

On the positive side, the attempts to limit fishing within SSLCH and the low fishing mortality rate of the pollock due to conservative setting of ABCs, are both management strategies that are designed to reduce the risk that pollock fishery has a negative impact on Steller sea lion. The balance of the evidence tends to suggest that pollock stock biomass is predominantly determined by environmental variation rather than by fishing mortality (see Principle 1 text), while the balance of the evidence on the causes of Steller sea lion decline seems to point towards top-down rather than bottom-up (i.e. food) limitation (Committee on the Alaska Groundfish Fishery and Steller Sea Lions, 2002).

Condition

To improve the deficiencies in performance for this indicator, the fishery must modify management of the fishery to address concerns identified from research required under conditions attached to Indicators 1.2.3, 2.3.1, and 2.3.3.

Indicator 3.3. There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.

100 Scoring Guidepost

- Alterations to fishing to recover and rebuild depleted species are based on a sound understanding of functional relationships between the impacted population and the fishery. This includes understanding predator-prey dynamics, species interactions, prey abundance/spatial distribution, foraging behavior, food web requirements and habitat needs.

80 Scoring Guidepost

- Alterations to fishing to recover and rebuild depleted species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts.

60 Scoring Guidepost

- Alterations to fishing to recover and rebuild depleted species are based on incomplete data, and are of largely unknown efficacy.

SCORE: 79

The score is better for fish stocks than it is for marine mammal populations, while less is known about interaction between the fishery and depleted populations of seabirds. Alterations to fishing to recover and rebuild depleted species are based on very incomplete data and understanding. In the GOA it is difficult to make a strong case that management to recover populations of depleted marine mammals has been precautionary, since the quantities of pollock removed from SSLCH have hardly been reduced from their previous high levels despite the series of different restrictions placed on fishing close to SSL rookeries and haul outs in recent years. Bernstein *et al.* (2002) suggest ‘Where the knowledge payoff would be great, leading to better conservation and management of the ecosystem, ways should be found to carry out meaningful field experiments using the fishery’.

The fact that it is unclear whether the fishery is the cause of declines in SSL populations is not a satisfactory reason for lack of action. The uncertainty over impact should have led to research to identify whether or not the fishery is the cause, and management should have responded in a timely manner and to introduce precautionary management until the cause-effect relationship had been resolved. According to APA (APA 2002; p106) 'As the hypothesized interactions between the Alaska groundfish fisheries and the vulnerable pinnipeds involve indirect ecosystem effects that are thought manifest via a localized depletion of prey resources, and thus intense competition for these resources, an appropriate research and monitoring program would be one that investigates and monitors the effect of the groundfish fisheries on the SSL prey field'. It is surprising that this research, identified as key to understanding by APA, has only just begun to be tackled and that no clear information on this question can yet be reported.

Furthermore, this is but one specific hypothesis relating to effects of the fishery on SSL prey fields; given the satellite tracking data indicating that SSLs may range over very large areas in search of food (National Marine Fisheries Service, 2001d), there are equally important questions yet to be tackled concerning how SSLs respond to reductions in pollock stock biomass, both at a local 'prey-field' scale and at a larger ecosystem scale. This is especially important given the current situation in the GOA where pollock biomass has declined to only about 29% of predicted unfished biomass.

For the relationships between the pollock fishery and depleted populations of harbor seals, kittiwakes and murres, very little is known, and so it is difficult to prescribe management of the pollock fishery that should help to recover these populations. There is, therefore, a need for research to determine what pollock biomass or density is required by populations of these species in order to permit them to forage at rates that support healthy populations and reproduction.

Condition

To improve the deficiencies in performance for this indicator, it is important that the fishery be able to determine the effects of pollock fishing on other species in the area other than Steller Sea Lions. Specifically, SCS is requiring that the fishery also collect data on harbor seals, kittiwakes and murres, when conducting the work required under Condition 2.3.1.

MSC PRINCIPLE 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent: The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

Introduction

This section presents an overview of the North Pacific pollock fishery management system. The observations in this section are based on more detailed or specific information presented in subsequent parts of this report devoted to MSC Principle 3. The assessment team has included this admittedly un-scientific overview because Principle 3 is a complex mix of concepts that do not easily lend themselves to quantitative analysis pursuant to unambiguous empirical evidence and because the audience for the topics emphasized by Principle 3 includes individuals and institutions concerned with matters other than science, including questions of public policy and bureaucratic administration.

The quality of a management system is measured in a mixture of qualitative and quantitative, objective and subjective terms because the products of a management system are very diverse. On the one hand, the system's products can be measured in biological or economic units. On the other hand, a management system also produces results that are measured against highly subjective substantive and procedural values. Assessing the quality of participatory democracy, a cardinal element of US fishery management, is, by way of comparative example, a very different task than judging the quality of a stock assessment model. The assessment team believes that most readers' understanding of the team's analysis and scoring under Principle 3 will benefit from the following overview.

The North Pacific pollock fishery management system is defined by superlatives-- and a central paradox. It is a huge fishery, one of the largest in the world and certainly the most massive in North America. The boats sent to take the fish, from some of the world's harshest fishing grounds, have few peers in terms of size, harvesting capacity, and profitability. Once dominated by foreign and out-of-state business interests, a significant share of the fishery is increasingly in the hands of local native Alaskans -- a transformation almost unheard of in the fishing industry.

The fishery resource is subject to intensive scrutiny by leading scientists employing state-of-the-art tools and techniques. Research funding is at an all-time high. The management system is infused with skilled resource managers and legal advisors and managed pursuant to a remarkably open and inclusive process that, in fact, stands well ahead of nominally identical processes elsewhere in the United States and other decision-making systems around the world. Fishery managers have launched a sophisticated public evaluation of a wide range of potential management plans that, if enacted, could better achieve ecological, economic, and social goals.

In contrast to the norm in so many other fisheries, the major part of this fishery seems to be positioned by effective management to continue to operate at or near current levels without dangerously depleting the pollock biomass.

But a number of influential and knowledgeable stakeholders in the fishery point to the fact that the pollock fishery has other, equally distinct features. The fishery's managers currently approve removal each year of more than a million tons of pollock biomass from the North Pacific, but do so guided by quite limited information about what those immense removals mean for the region's ecosystem. Yet the ecosystem includes species of marine mammals and seabirds that rely in part on pollock for food, and are known to be in decline. The management system, though generally (and often fully) aware of the declines in these populations, has at times responded to these problems with belated research focus and management measures. And in some cases, the responses have only developed after a population has dropped so low that the animals fell within the protection of the federal Endangered Species Act.

The fishery managers usually set conservative catch levels relative to available biomass, but operate under rules that allow depletion of 95 percent of the natural pollock biomass -- without any direct scientific knowledge of impact of those removals on pollock recruitment (or the ecosystem). While the dominant pollock stock in the eastern Bering Sea is healthy, other smaller pollock stocks within the Bering Sea and under the responsibility of the management system are in situations that are much less certain.

Stakeholders also expressed concern that, while the management system is open, public, and supported by highly skilled and committed professionals, it can be highly resistant to credible information and advice from both agency scientists and stakeholders that would constrain harvests or call into question the adequacy of established analytical tools and systems. Critics of the system point to the fact that fishery managers have at times produced decisions that have been discredited and reversed by federal courts.

The assessment team was presented with substantial evidence, and witnessed first-hand, that the National Marine Fisheries Service is divided internally and burdened by discord, and sometimes palpable animosity among different scientific and administrative factions. While NMFS officials have comprehensive legal and administrative authorities to employ in management of the fishery, their behavior and de facto authority appear compromised by internal contention and the ability of dominant political interests in the fishery to use their considerable influence to prevent imposition of management measures they do not want.

Here, then, is the apparent paradox. From one side, the North Pacific pollock fishery looks every bit the best managed fishery in the world, an indisputable success story. But seen from the other side, it is a fishery with systemic flaws, discord among managers, and aggrieved stakeholders who believe that the fishery risks significant harm to the environment and is badly in need of improvement.

Each image of the fishery has strong elements of truth. An evaluation of the North Pacific pollock fishery needs to recognize these competing perspectives and make sense of them in relation to the Principles and Criteria promulgated by the Marine Stewardship Council. In working to make sense of all the information provided to the assessment team, the best device is to recognize that the management of the North Pacific pollock fishery is a complex and dynamic system. It is changing. Some of the system's present features represent only its past, while others reveal how the system may work in the future. A reviewer's challenge is to sort them out and make a judgment about the fishery that acknowledges both what it is and what it is headed toward being under its own momentum.

This fishery management system falls short of doing everything that the managers and stakeholders know they need from it, but it does nearly as much as anyone in this realm of natural resource management knows how to do, far more now than it did even a few years ago, and much more than virtually any other natural resource management regime. Seen from one entirely reasonable perspective, it is truly extraordinary that a relative handful of government, academic, conservation and industry professionals -- who worked, until quite recently, with scant resources -- has devised a system that does so much so well and continues to improve steadily.

While the history of contention and litigation surrounding the pollock fishery is troubling, the manifest history and foreseeable future of continual improvement is redemptive. The overall high quality of this fishery is the sum of the skills, energies, and opinions of the people who care about it for one reason or another. The information presented to the assessment team reflected the assembled and accumulating wisdom of committed and talented people who have very different priorities, personal and organizational cultures, and problem solving approaches. And all of them have been given a forum, admittedly somewhat dis-integrated, through which to work it all out and get better at working together to achieve broadly acceptable results.

Does this mean that the management system for the pollock fishery is per se sustainable? If there were a single, inarguable, fixed definition of sustainability; if all scientists, managers, fishers, conservationists could agree on what makes a fishery "sustainable," it might be appropriate to fix only on the way the fishery management process works today to draw a comparison between the object and its measure. But we do not have that. We have a growing and improving understanding of the earth's ecological processes and the parts that make it up. And, not coincidentally, we have a growing and improving understanding of what we are capable of managing in and through the ecosystem. Here, where the definitional goal itself is in movement, the most revealing quality of the system by which we manage a fishery to be "sustainable" is that system's ability to deliver ever-improving results. The system cannot lock onto a fixed target; it must move forward in response to evolving understanding of what it should and can do.

In the view of the assessment team, the pollock fishery management system has shown in the past several years the most revealing positive sign conceivable: It has begun to ask the right questions. NMFS and the North Pacific Fishery Management Council ("North Pacific

Council" or "NPFMC") have launched a comprehensive analysis of North Pacific groundfish management through preparation of the so-called "Programmatic Supplemental Environmental Impact Statement" ("PSEIS"). In the course of developing the analytical framework for the PSEIS, the management system has begun to organize itself to make informed choices about how to manage fishing activities fully within the context of the human and natural environment of which pollock is a part. The system is making, continued tangible progress toward fully acknowledging the array of legal and social perspectives from which fishing activities are viewed and the information needed to test those perspectives and reach the broadest measure of achievement toward meeting management's obligations and opportunities.

It is relevant to note that NMFS and the North Pacific Council have made important changes because federal courts or the U.S. Congress have told them to. One might wish that the history of institutional change had followed a more congenial path if only because it seems so obvious in retrospect that some fights were not worth having when compared to the other purposes toward which human energies could have been directed. But the reason for change is ultimately less important than the fact of it. And the fact is that the pollock fishery management system is improving in fundamental, vital, and precedential ways that earn it a passing score under MSC Principle 3, albeit with conditions.

It is important for the reader to understand that the assessment team's review of the "management system" has been heavily influenced by our threshold decision to adopt a broad definition of that term. As used in this report, the term "management system" is used broadly to include both governmental and private sector components (i.e., catcher-cooperatives). And governmental components include all applicable governmental systems (i.e., the federal courts and Congress), not merely the direct regulatory function of the National Marine Fisheries Service and North Pacific Fisheries Management Council.

Our reasoning on how to conceptualize the pollock management system reflects the fact that, while NMFS and the Council clearly have dominant regulatory roles, they often are not in full control of institutional forces affecting the fishery. Neither the federal courts nor Congress regulate the fishery in the traditional sense of the word, but from time-to-time it is undisputable that judges and legislators are deciding major issues for the fishery. And they do so at the behest of stakeholders in the fishery, who seek leverage or support for their positions by opportunistically invoking the authorities of all of the branches of the U.S. federal government.

The conservation community's comments on the draft assessment report included strong criticism of the team's use of a broad definition of the pollock management system. They argue that the proper definition would be limited to NMFS and the North Pacific Council, and that the result of including the courts in the definition is to bias upward many of the scores awarded to Principle 3 scoring indicators. (The conservation stakeholders are silent on the question whether inclusion of Congress in the definition results in a scoring premium or discount).

The assessment team agrees that many of the scores awarded under Principle 3 are probably higher, even quite a bit higher, than they would have been if we had limited our review of the "management system" to only NMFS and the Council. We cannot rule out the possibility, cited by the conservation groups in their comments on the draft report, that the fishery's passing score under Principle 3 rests predominately on the definition of "management system" we applied.

In asking the team to assess management of pollock by appraising NMFS and the Council in isolation from other influences, the conservation stakeholders would ask us to ignore the glaringly evident fact that the conservation stakeholders themselves regularly exert significant influence over management of the pollock fishery by invoking the authority of the courts, as well as by participating in the regulatory processes of NMFS and the Council.[2] Similarly, some of the most ambitious and progressive aspects of current fishery management exist because these conservation stakeholders and others successfully petitioned the Congress to amend federal fisheries law to require, for example, protection of essential fish habitat and adoption of ecosystem-based management.

It would have been unreasonable and arbitrary to assess the pollock management system solely in terms of the roles and performance of NMFS and the North Pacific Council. As a matter of both law and fact, responsibility for management of the pollock fishery lies in many hands throughout government and the private sector and all the principal stakeholders operate with full understanding of that fact. The pollock management system is an intertwining of many subsystems, and it is the assessment team's view that the system must be assessed as a whole.[3]

Discussion

a. Overview of Fisheries Management System

Governmental decision-making processes lag behind our capacity to conceptualize or otherwise create questions or recognize needs (Ostrom, 1990; Ruckelshaus, 1997).[4] Members of our society, including scientists, conservationists, and entrepreneurs, see needs and opportunities before government adapts to serve them or address conflicts among them.

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[2] The conservation stakeholders assert that "The judicial system has involvement with fisheries only when it has been demonstrated that fisheries management is illegal." This statement is misleading because it ignores the very profound influence that the mere threat of litigation has on the management system. The stakeholders also complain "That the federal courts can offer some redress for illegal fisheries management actions does not demonstrate that the fisheries management system works. To argue that it does is like arguing that the fact that one can sue a drunk driver for damages demonstrates that the traffic management system works." This analogy is misleading. The "drunk driver" is to the highway system as an individual fisherman is to the fishery. The more apt comparison between fishery management and highway management would focus on the conjunction of governmental authorities and private sector interests involved in siting a new highway or setting the rules for use of the road once built, including penalties for violations, such as drunk driving.

[3] We note that others have adopted an equivalent definition of the management system when trying to assess its performance. For example, a recent National Academy of Public Administration report on US fishery management says: "In a real sense, the fisheries management system is in disarray. Management is increasingly exercised by the courts through litigation, by Congress through its annual appropriations and reports, and by constituencies that seek redress through these forms. The regional councils and NMFS, which were assigned this mission by statute, are being driven to management-by-crisis due to a range of problems: litigation-related workload, court-ordered or sanctioned deadlines, process deficiencies, policy mandates, regulatory delays, inadequate resources, deficiencies in data, analyses, and science, and strained relationships between the system's managerial partners and their constituencies." National Academy of Public Administration, *Courts, Congress, and Constituencies: Managing Fisheries by Default*, p. xi (2002).

[4] Ostrom,1990 "We do not yet have the necessary intellectual tools or models to understand the array of problems that are associated with governing and managing natural resource systems and the reasons why some institutions seem to work in some settings and not others."

Citizens can demand extremely difficult things from their government. It is particularly true in those places, like the United States, where government has been directed by law to reconcile capitalist and industrialist energies and traditions with the contemporary citizen's preference for the highest levels of environmental performance. Though Americans pretend to skepticism and cynicism about government, in fact (and perhaps without always being aware of it) they have very high expectations for public decision-making bodies and those who lead them.

America's pluralistic society has charged its federal fishery managers to manage for profitable business and intact ecosystems. In the broadest sense, neither set of values is by legal definition subordinate to the other, but one may at any given time be more understandable or achievable and, of course, it has long been the case that tangible economic benefit was much more understandable and measurable than other goals, and so it has been easier to manage toward. But each set of goals is enshrined fully in the law and ecosystem principles are becoming better understood. What is missing is a ready, objective and proven set of standard rules for reconciling those goals when they conflict.

As reported to the U.S. Congress by a former senior NOAA official and consultant to a panel assembled by the National Academy of Public Administration to review NMFS management:

> There are more than 100 pieces of substantive legislation mandating NMFS activities, as well as Executive Orders governing the NMFS regulatory process. The reconciliation of these laws and instructions falls to NMFS with a sense from the different laws that each assignment is a top priority. I believe that NMFS' ability to conserve the fisheries, protect the environment, promote US economic interests, encourage recreational fishing and address socio-economic issues would be enhanced, if Congress were to make a statement of its priorities for the US fisheries and simplify the procedures for achieving US fisheries objectives (Kammer, 2002).

The overall challenge of fishery management in the U.S. is particularly difficult in the context of North Pacific pollock fishery management. There are few decision-making processes anywhere in the world charged with integrating ecological, economic, and social understanding across so much time, geography, and substantive diversity (Hogarth, 2002). Stakeholders in the pollock fishery naturally have very different opinions on the direction that management should take, and press managers from all sides. The management system has struggled with the job, especially as to incorporation of the views of conservation stakeholders, and even some of the most seasoned managers have fallen prey to frustration (Benton, 2002).[5]

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[5] As the Chairman of the NPFMC recently testified:

> In recent years, much of our effort has, unfortunately, been focused on responding to litigation, most of which focuses on procedural matters. This has thwarted our efforts to take up new initiatives to manage and reduce bycatch and protect important fisheries habitat. We have a very transparent process that relies on the participation of all sectors of the public. Again, unfortunately, much of the litigation we are addressing comes from special interests that have decided to not participate in this very public forum. Apparently, they prefer to go to court, and then get in a closed room and conduct backroom negotiations with federal attorneys. Away from the public eye. Away from the science based deliberations that Congress intended when you established the Magnuson-Stevens Act and NEPA, and the other relevant statutes.

The challenge of North Pacific pollock management is further complicated by its place within a national system of rules and policy priorities. Management of North Pacific pollock takes place as part of the nationwide program under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The policies, standards and requirements set by the Act, as well as the quality of the Act's implementation and results are subject to an almost continuous debate within the United States resource management, conservation, academic, and fishing stakeholder communities. Year-to-year the focus of attention shifts among specific issues, but it would seem to be a rare moment when the Act and the major fisheries conducted under it, including the North Pacific pollock fisheries, are not under intense scrutiny and pressure to improve.

The United States Congress regularly holds hearings related to implementation of the Act[6] and annually considers proposed amendments reflecting a wide array of policy perspectives. The National Research Council of the National Academy of Sciences has produced a steady flow of reports on various questions associated with marine resource management and implementation of the Magnuson-Stevens Act, including reports on the North Pacific fisheries, Steller sea lion, and the Bering Sea ecosystem. The National Academy of Public Administration has analyzed NMFS' capacity to carry out the law.[7] A congressionally chartered panel of experts is evaluating the nation's overall oceans policy, including management of marine resources, and recently issued a preliminary report calling for sweeping changes in law and administration.[8] Two highly respected non-governmental organizations have sponsored sophisticated independent analyses of the management system and the needs of contemporary marine resource management (Pew, 2003; Heinz 2000).

Pressed to meet its multiple mandates by competing constituencies, pushed by evolution in national policy, the management of the Bering Sea-Aleutian Island (BSAI) pollock fishery is, step-by-step, undergoing profound change. The apparent problems and evident conflicts of

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[6] For example, the leading measure to reauthorize the Magnuson-Stevens Act, H.R. 4749 was introduced on May 16, 2002, by Congressman Wayne T. Gilchrest. The bill was referred to the Committee on Resources, and within the Committee to the Subcommittee on Fisheries Conservation, Wildlife and Oceans. The Subcommittee held seven hearings on the reauthorization of the Magnuson-Stevens Act, including six oversight hearings on various aspects of the reauthorization and one legislative hearing on a discussion draft for the authorization. The Subcommittee heard from 59 public witnesses and a number of Members of Congress. Hearings were held on: implementation of the Sustainable Fisheries Act and the reauthorization of the Magnuson-Stevens Act on April 4, 2001 (Printed Hearing 107-15); federal capacity reduction programs, federal investments in fisheries and how these programs relate to the reauthorization of the Magnuson-Stevens Act on May 10, 2001 (Printed Hearing 107-26); ecosystem-based fishery management and the reauthorization of the Magnuson-Stevens Act on June 14, 2001 (Printed Hearing 107-38); Western Alaska Community Development Quota Programs Implementation Improvement Act on July 19, 2001 (Printed Hearing 107-50); Cooperative Research issues as they affect the reauthorization of the Magnuson-Stevens Act on December 6, 2001 (Printed Hearing 107-79); Individual Fishing Quotas (IFQs) on February 13, 2002 (Printed Hearing 107-84); and a legislative hearing on the discussion draft of H.R. 4749 on May 2, 2002 (Printed Hearing 107-111).

[7] National Academy of Public Administration, *Courts, Congress, and Constituencies: Managing Fisheries by Default* (2002).

[8] U.S. Commission on Ocean Policy, *Preliminary Report* (2004); http://oceancommission.gov

values involving the pollock fishery have revealed needs for new substantive understandings and, inevitably, the processes to accommodate them. The pollock fishery management process is simultaneously inventing and mastering the language of contemporary natural resource management and can properly be understood only by evaluating it in that dynamic context.

b. Legal and Administrative Structure

Numerous commentators have described the complex statutory and regulatory system governing U.S. marine fisheries (Scheiber, Harry 2001; Symposium, The Magnuson Fishery Conservation and Management Act: Retrospect and Prospect (1996); Dana, David A. (1997).[9] For the purpose of this evaluation, the team relied primarily upon explanations of the management system prepared by the federal government through the National Marine Fisheries Service, particularly the quite comprehensive documentation developed by NMFS in connection with its preparation of the PSEIS for the agency's North Pacific groundfish management (NMFS, 2001). Much of the following text draws directly from a draft of that analysis.

The legal basis for the federal government to conserve and manage marine fisheries in the U.S. Exclusive Economic Zone (EEZ) is founded on the principle of western society known as the public trust doctrine. Because the public trust principles apply to the fisheries in the federal EEZ waters, the federal government has the responsibility to conserve those fishery resources for the overall benefit of the people of the United States. Conservation of any biological resource, such as a fishery resource, implies imposing constraints on the use of the resource to prevent its destruction and provide for its sustained availability to current and future fisheries. Benefit implies an economic or socioeconomic objective which may not be consistent with conservation objectives. Hence, the federal public trust responsibility often is carried out by implementing management policies that reflect a difficult balance between conflicting interests.[10]

The formulation and implementation of all federal fishery management policies are guided by, and must comply with, the limitations and procedures stipulated in a body of federal statutes and executive orders. Some of these mandates speak directly to the conservation or management of fishery resources, but most are directed toward allocating the benefits and burdens of management measures and ensuring that potential environmental, economic, and social effects of these mandates are considered before they are adopted. The U.S. government executive branch's responsibility for compliance with these mandates resides primarily with the Secretary of Commerce and has been delegated largely to the National Marine Fisheries Service (NMFS), also known as "NOAA Fisheries," one of the five agencies of the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce.[11]

[9]. The reader is directed to http://www.noaa.gov/fisheries.html for a variety of resources prepared by the U.S. government to describe the domestic fishery management system; http://www.pewoceans.org for discussion of contemporary reform proposals.

[10] PSEIS at 2.3.1.

[11] In recent years, NOAA officials and others have adopted the name "NOAA Fisheries" in preference to "National Marine Fisheries Service." The two names for the same agency are used interchangeably in this report.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act is the principal federal statute that provides for the management of U.S. marine fisheries. Originally enacted as the Fishery Conservation and Management Act in 1976, this law is the most significant fisheries legislation in U.S. history. It has been amended periodically since 1976; most recently in 1996, by the Sustainable Fisheries Act (Territo, 2000).[12] The basic concepts of the Magnuson-Stevens Act have not changed. They include the following:

- The biological conservation of a fishery resource has priority over its use.
- Conservation and management decision making must be based on the best available scientific information, which should include social, economic, and ecological factors along with biological factors.
- The needs of fishery resource users vary across the nation, and public participation in the policy making process should be maximized.

The Magnuson-Stevens Act (as amended by the Sustainable Fisheries Act in 1996) included the following policy statement regarding the nation's fisheries:

POLICY–It is further declared to be the policy of the Congress in this Act:

(1) to maintain without change the existing territorial or other ocean jurisdiction of the United States for all purposes other than the conservation and management of fishery resources, as provided for in this Act;

(2) to authorize no impediment to, or interference with, recognized legitimate uses of the high seas, except as necessary for the conservation and management of fishery resources, as provided for in this Act;

(3) to assure that the national fishery conservation and management program utilizes, and is based upon, the best scientific information available; involves, and is responsive to the needs of, interested and affected states and citizens; considers efficiency; draws upon federal, state, and academic capabilities in carrying out research, administration, management, and enforcement; considers the effects of fishing on immature fish and encourages development of practical measures that minimize bycatch and avoid unnecessary waste of fish; and is workable and effective;

(4) to permit foreign fishing consistent with the provisions of this Act;

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[12] Sustainable Fisheries Act, Pub. L. 104-297. See An Annotated Guide to the Major Provisions of the Sustainable Fisheries Act, 3 Ocean & Coastal L.J. 307 (1997)

(5) to support and encourage active United States effort s to obtain internationally acceptable agreements which provide for effective conservation and management of fishery resources, and to secure agreements to regulate fishing by vessels or persons beyond the exclusive economic zones of any nation;

(6) to foster and maintain the diversity of fisheries in the United States; and

(7) to ensure that the fishery resources adjacent to a Pacific Insular Area, including resident or migratory stocks within the exclusive economic zone adjacent to such areas, be explored, developed, conserved, and managed for the benefit of the people of such area and of the United States.[13]

The Magnuson-Stevens Act also sets out ten National Standards that serve as the overarching objectives for fishery conservation and management:

(a) IN GENERAL–Any fishery management pl an prepared, and any regulation promulgated to implement any such plan, pursuant to this title shall be consistent with the following national standards for fishery conservation and management:

(1) Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

(2) Conservation and management measures shall be based upon the best scientific information available.

(3) To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

(4) Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (a) fair and equitable to all such fishermen; (b) reasonably calculated to promote conservation; and (c) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

(5) Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

(6) Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

[13] 16 U.S.C. 1801, Sec. 2(c).

(7) Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

(8) Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (a) provide for the sustained participation of such communities, and (b) to the extent practicable, minimize adverse economic impacts on such communities.

(9) Conservation and management measures shall, to the extent practicable, (a) minimize bycatch and (b) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

(10) Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.[14]

The Magnuson-Stevens Act also mandates the Secretary of Commerce to develop advisory guidelines to assist in fishery management plan (FMP) development. These guidelines serve primarily to interpret and aid compliance with the national standards.[15]

In recent years, amendments to the Magnuson-Stevens Act have played a critical role in framing the regulatory regime within which the North Pacific pollock fisheries operate. In particular, overfishing concerns, resource allocation among competing users, bycatch management, and conservation of essential fish habitat have become issues addressed by Magnuson-Stevens Act amendments. On this latter point, the Magnuson-Stevens Act now mandates that any FMP must include a provision to describe and identify essential fish habitat (EFH) for the fishery (Fletcher and O'Shea 2000), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat. Essential fish habitat has been broadly defined by the Act to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MacPherson, 2001; Hsu and Wilen, 1997; Fluharty et al., 1998)."

American Fisheries Act

Next to the Magnuson-Stevens Act, the American Fisheries Act[16] (AFA) is the only other fisheries-specific legislation affecting how groundfish fisheries in the BSAI and, to a lesser extent, the Gulf of Alaska (GOA) are managed. The AFA, enacted in October 1998, represents the culmination of a decade-long struggle over the allocation of pollock in the BSAI (Wilen, 1999). The AFA institutionalized a resource allocation scheme among

[14] 16 U.S.C. 1851, Sec. 301(a).

[15] Codified at 50 CFR Part 600, and most recently revised on May 1, 1998 [63 FR 24212].

[16] The terms and history associated with the AFA are well described in the report available at http://www.fakr.noaa.gov/sustainablefisheries/afa/afa_sf.htm

competing onshore and offshore components of the fish processing industry. Major provisions of the AFA include the following:

- Requirement of a minimum of 75 percent U.S. ownership of fishing vessels, up from majority ownership, and maximum size and horsepower limits for replacement vessels;

- Specific allocation of the BSAI directed pollock fishery total allowable catch (TAC) among the inshore component (50 percent) catcher/processor vessels in the offshore component (40 percent), and motherships in the offshore component (10 percent) after first deducting 10 percent of the total TAC for the Community Development Quota (CDQ) Program and an incidental catch allowance;

- Buyout of nine catcher/processor vessels' future fishing privileges, financed through a combination of a grant and direct loan obligations, to be paid back by a tax of $0.006 per pound of pollock harvested by the inshore sector;

- Specific naming of 20 catcher/processor vessels that may participate in the (offshore) pollock fishery, 7 catcher vessels that may deliver pollock to those catcher/processors, and 19 catcher vessels that may deliver pollock to motherships;

- Criteria for catcher vessels to participate in harvesting BSAI pollock in the inshore sector, and criteria for limiting the participation of onshore processing plants in the BSAI pollock fishery;

- Fishery cooperatives with limitations on the structure and participation among cooperatives involving catcher vessels and the inshore sector processing plants; and

- Directions for the North Pacific Council to develop or improve on limitations (sideboards) on the activities of AFA vessels and processors in non-pollock fisheries to prevent negative spillover effects of fishery cooperatives.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) [17] is a cornerstone environmental mandate that declares a national policy to encourage productive and enjoyable harmony between man and the environment, and to promote efforts to better understand and prevent damage to ecological systems and natural resources important to the nation. NEPA, signed into law in 1970, requires federal agencies to evaluate the potential environmental effects of any major planned federal action to ensure that public officials make well-informed decisions about the potential impacts. The law seeks to promote public awareness of and opportunity to comment on the potential impacts at the earliest planning stages of major federal actions.

[17] 42 U.S.C. § 4321-4347; Pub. L. 91-190, as amended.

The Act requires federal agencies to prepare a detailed environmental evaluation for any major federal action significantly affecting the quality of the human environment. As with the Magnuson-Stevens Act, NEPA requires an assessment of both the biological and social/economic consequences of fisheries management alternatives. The law requires agencies to provide the public an opportunity to be involved in and provide comments pertaining to decision making on federal actions. In short, NEPA ensures that environmental information is available to government officials and the public before decisions are made and actions are taken. NEPA does not require that an agency choose the most environment-friendly alternative from among the options for action available to it.

NEPA established the Council on Environmental Quality (CEQ) to review government policies and programs for conformity with the law. CEQ is also responsible for oversight of regulations and procedures implementing NEPA, and has prepared guidance for federal agencies regarding NEPA regulations.[18] CEQ regulations and guidance documents establish requisite procedures for issue scoping, consideration of alternatives, evaluation procedures, public involvement and review, and coordination between agencies. All of these steps are applicable to development of FMPs.

NOAA has also prepared environmental review procedures for implementing NEPA.[19] Promulgated as an agency order, it describes NOAA's policies, requirements, and procedures for complying with NEPA and the implementing regulations issued by CEQ. The order provides comprehensive and specific procedural guidance to NMFS and the regional management councils, including the North Pacific Council, for preparing and adopting groundfish FMPs.[20]

Federal fishery management actions subject to NEPA requirements include the approval of FMPs, FMP amendments, and FMP implementing regulations. Such approval requires preparation of either an environmental impact statement (EIS) for major fishery management actions that significantly affect the quality of the human environment or an environmental assessment (EA) for fishery management actions that will not significantly affect the human environment. Generally speaking, NEPA and the Magnuson-Stevens Act requirements for schedule, format, and public participation are compatible and allow one process to fulfill both obligations. If an EIS is prepared, however, the notice of availability of a final EIS must be published at least 30 days before the Secretary of Commerce approves, disapproves, or partially approves an FMP or FMP amendment.

Endangered Species Act

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[18] 40 CFR Part 1500.

[19] NOAA Administrative Order 216-6.

[20] The council has the primary responsibility for initiating the NEPA scoping process, deciding whether an environmental assessment or environmental impact statement should be prepared, developing and selecting the alternatives to a proposed action, preparing draft environmental documents, and soliciting public comments on the draft documents, in consultation with NMFS. NMFS has the final authority for determining NEPA compliance as part of the process of approving, disapproving or partially approving the council's actions.

The Endangered Species Act (ESA),[21] passed in 1973 and reauthorized in 1988, provides broad protection for fish and wildlife species that are listed as threatened or endangered. The law makes provisions for the formal listing of species, development of recovery plans, and designation of critical habitats. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize species. Responsibilities for implementing the ESA are shared by the U.S. Fish and Wildlife Service (freshwater fish, birds, terrestrial mammals, and plants) and NMFS (anadromous and marine fish, most marine mammals, sea grasses).

NMFS is therefore tasked with both managing the groundfish harvest through FMPs, and ensuring that identified threatened and endangered species (e.g., the Steller sea lion) receive appropriate consideration and protection during the planning and implementation of groundfish harvests.[22] It should be noted that, under law, compliance with ESA provisions is not subject to modification based on economic hardship.
Section 7(a) (1) of the ESA requires federal agencies to conserve endangered and threatened species; however, conservation is broadly defined. Section 7(a) (2) of the ESA requires federal agencies to ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize or result in the destruction or adverse modification of the critical habitat of endangered or threatened species. Under an FMP, all fishing activities must be considered; not just the specific management measures under consideration. NMFS must conduct a formal Section 7 consultation that results in a biological opinion (BiOp or BO) if a proposed action "may affect" or "is likely to adversely affect" endangered or threatened species or their critical habitat. If the BO concludes that the proposed action "is likely to jeopardize the continued existence of" threatened or endangered species, then reasonable and prudent alternatives are developed to minimize or mitigate the effect of the action. Once determined, the fishery management regulations should be revised to implement the reasonable and prudent alternatives.

A number of other federal laws and executive orders influence the pollock fishery management system, though their respective roles do not merit detailed discussion in this report because their provisions are less directly relevant to the principal issues facing the North Pacific pollock management system at this time.

Administrative Structure[23]

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[21] 16 U.S.C. § 1531 *et seq.*

[22] The council has the authority to develop fishery management plans and take other actions under the Magnuson-Stevens Act, subject to the review and approval of the Secretary of Commerce. Given the ESA's broad definition of "federal agency" and of "action," and prior legal precedent concluding that councils are federal agencies for other purposes, the council is part of the "action agency" for purposes of the ESA. The council has the initial responsibility for assessing the impact of fishery management actions on listed species and critical habitat. The council also has the affirmative duty under Section 7(a)(1) of the ESA to use its authority in furtherance of the purpose of the ESA. NMFS has the final authority for determining ESA compliance as part of the process of approving, disapproving or partially approving the council's recommended actions. As the "consulting service," NMFS also has the responsibility of preparing any biological opinion with respect to any approved fishery management action under Section 7 of the ESA. The council has additional opportunities to participate in implementation of the ESA in light of NMFS' policy with respect to the development of recovery plans and conservation regulations under Section 4 of the ESA.

[23] The following discussion of the administrative process by which the North Pacific Fishery Management Council and National Marine Fisheries Service fulfill their responsibilities relies heavily on a particularly well-researched and well-written legal memorandum prepared for the North Pacific Council and posted on the Council's website at http://www.fakr.noaa.gov/npfmc/misc_pub/Legal%20Assmt.110702.pdf

The Magnuson-Stevens Act set up a unique process for making management decisions, including an unprecedented administrative institution, the fishery management council, as part of the fishery management process overseen by the Secretary of Commerce. One of the purposes of the Act was--

> to establish Regional Fishery Management Councils to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revision of [fishery management] plans under circumstances (A) which will enable the States, the fishing industry, consumer and environmental organizations, and other interested persons to participate in, and advise on, the establishment and administration of such plans, and (B) which take into account the social and economic needs of the States[.] 16 U.S.C. § 1801(b)(5).

The North Pacific Fishery Management Council was one of eight created upon enactment of the Magnuson-Stevens Act in 1976. 16 U.S.C. § 1852(a)(1)(G). Unlike other councils, which have authority over fisheries in more than one state, the North Pacific Council has authority over the fisheries in the Arctic Ocean, Bering Sea, and Pacific Ocean seaward of Alaska, the largest geographic area of any council. However, the membership of the North Pacific Council includes representatives from the states of Alaska, Washington, and Oregon.

The members of each council are either state or federal employees or individuals selected from the private sector who are paid a daily compensation amount based on civil service pay scales and are reimbursed for their expenses. 16 U.S.C. § 1852(d). Each council is authorized to appoint an executive director and a staff of full- and part-time employees. Council members (except federal employees) and their staff are not considered federal employees subject to regulations issued by the Office of Personnel Management. 50 C.F.R. § 600.120; 16 U.S.C. § 1852(f). The Secretary of Commerce is required to provide administrative and technical support services to a council and the Administrator of General Services supplies such offices, equipment, supplies, and services as he is authorized to furnish to any other agency or instrumentality of the United States. Id. Specific rules of conduct apply to Council members and their staff. 50 C.F.R. § 600.220. Council members must also meet financial disclosure and recusal requirements set forth in the Act. 16 U.S.C. § 1852(j). Each council is required to determine its own method of organization and to prescribe practices and procedures for carrying out its functions under the Magnuson-Stevens Act. 16 U.S.C. § 1852(e); 50 C.F.R. § 600.115. The Federal Advisory Committee Act does not apply to the councils or to scientific and statistical advisory committees or advisory panels created to advise the councils. Instead, the Magnuson-Stevens Act contains procedural requirements that guide the functioning of the councils and the committees and panels each creates. 16 U.S.C.§ 1852(i). In summary, regional fishery management councils are statutory entities with a certain degree of independence from the Department of Commerce that carry out a federal function.

The councils have enumerated statutory duties to fulfill that are prescribed by the Magnuson-Stevens Act and that must be carried out in a manner fully consistent with "other applicable law," such as the Administrative Procedure Act (5 U.S.C. § 551 et seq.), NEPA, the ESA and any other relevant statute. 16 U.S.C. §§ 1853(a)(1)(A), 1853(a)(1)(C).

The primary functions of the councils are set forth in section 302(h) of the Magnuson-Stevens Act. 16 U.S.C. § 1852(h). The councils are charged with the following duties, to be undertaken in accordance with the entire Act:

> (1) For each fishery under its authority that requires conservation and management measures, each council is to prepare and submit to the Secretary (A) a fishery management plan, and (B) amendments to each such plan that are necessary from time to time (and promptly whenever changes in conservation and management measures in another fishery substantially affect the fishery for which such plan was developed).
>
> (2) Each council is to prepare and submit comments on any application for foreign fishing submitted to it by the Secretary of State, any application for a transshipment permit submitted to it by the Secretary of Commerce, and any Secretarial fishery management plan or amendment to any such plan prepared by the Secretary of Commerce.
>
> (3) Each council is to conduct public hearings on the development of fishery management plans, amendments thereto, and on the administration and implementation of the provisions of the Act for any fishery under such council's jurisdiction.
>
> (4) Each council shall submit reports requested by the Secretary of Commerce or any other report deemed appropriate by the council.
>
> (5) Each council shall review on a continuing basis and revise as appropriate the assessments and specifications made by it of the maximum sustainable yield and optimum yield from, the capacity and extent to which U.S. processors will process fish harvested from, and the total allowable level of foreign fishing from each fishery in its geographical area.
>
> (6) Each council is to comment on and make recommendations concerning any activity undertaken, or proposed to be taken, pursuant to any Federal authority that may affect the habitat of any species under its jurisdiction.
>
> (7) Each council shall conduct such other activities which are required by, or provided for in, the Magnuson-Stevens Act or which are necessary and appropriate to the foregoing functions.

In the preparation of fishery management plans (and amendments), the councils are to be guided by mandatory and discretionary requirements for each plan or amendment and the National Standards set forth in the Act and further elaborated upon by NMFS in a set of regulations. 16 U.S.C. §§ 1853(a) and (b), 1851; 50 C.F.R. § 600.305-355.

In addition, in various other provisions in the statute, the councils are given additional duties and responsibilities: the councils are to prepare and submit proposed regulations to implement fishery management plans, 16 U.S.C. § 1853(c); comment on FMPs prepared by the Secretary, 16 U.S.C. § 1854(c); prepare FMPs, FMP amendments, and proposed regulations for any stock determined to be overfished by the Secretary, 16 U.S.C. § 1854(e); request the taking of emergency action, 16 U.S.C. § 1855(c); establish fishery negotiation panels, 16 U.S.C. § 1855(g); request or prepare fishing capacity reduction programs, 16 U.S.C. § 1861a(b); assist in the implementation of a standardized fishing vessel registration and information management system, 16 U.S.C. § 1881(a); and recommend special information collection programs, 16 U.S.C. § 1881a(a).

The North Pacific Council has further duties specified in the Magnuson-Stevens Act and related statutes, including establishing a western Alaska community development quota program for Bering Sea fisheries, 16 U.S.C. § 1855(i)); preparing a fisheries research plan for all fisheries under the Council's jurisdiction, 16 U.S.C. § 1862(a)); creating a bycatch reduction incentive program, 16 U.S.C. § 1862(f)); and reporting on and recommending measures with respect to various aspects of the American Fisheries Act (Pub. L. 105-277, Oct. 21, 1998).

The councils' membership, staff, and supporting committees are not large enough nor were ever intended to engage in extensive data-collection and analysis. These tasks are undertaken by regional science centers managed by NMFS. NMFS provides data, stock assessments, socio-economic information, computer and other analyses, and other information to the councils during the fishery management process. Moreover, the councils rely upon NMFS for administrative support in carrying out many of their duties, because of their small staffs. The manner in which the councils and NMFS interact on routine fishery management issues is set forth in a publication entitled "Operational Guidelines: Fishery Management Plan Process" prepared by NMFS (Revised May 1, 1997) (Guidelines). The Guidelines provide detailed guidance on how NMFS believes the fishery management process should work on a routine basis. These Guidelines, along with the Statement of Organization, Practices and Procedures that must be published by each council (50 C.F.R. § 600.115) and all related statutes and regulations, set the parameters within which a council carries out its responsibilities under the Magnuson-Stevens Act.

The key relevant functions of the Secretary of Commerce, which have largely been delegated to NMFS, are contained in Sections 304, 305, and 311 of the Magnuson-Stevens Act. 16 U.S.C. §§ 1854, 1855, 1861. NMFS must review any fishery management plan (or amendment) transmitted by a council to determine if it is consistent with the national standards, the other provisions of the Magnuson-Stevens Act, and any other applicable law. Following review, the plan or amendment is to be approved, disapproved, or partially disapproved within 30 days after the close of the public comment period for the plan or amendment. If disapproved in whole or in part, NMFS must specify to the council the nature of the inconsistencies and recommend how the plan or amendment should be changed to conform to applicable law. 16 U.S.C. § 1854(a). If NMFS fails to notify the council within the 30 day period, the plan or amendment is deemed approved. Under this provision, NMFS has the final word on whether a transmitted plan or amendment is consistent with applicable law, not the council.

NMFS is also to review proposed regulations transmitted by the council to ensure these are consistent with the plan or amendment, the provisions of the Magnuson-Stevens Act, and other applicable law. If so consistent, NMFS may publish the proposed regulations, with any technical changes deemed necessary for public comment. If not so consistent, NMFS is to make recommendations to the council about changes in the regulations to make them consistent. Final regulations are to be published 30 days after the close of the comment period on the proposed regulations. 16 U.S.C. § 1854(b).

NMFS may repeal or revoke a fishery management plan only if the responsible council approves the repeal or revocation by a three-quarters majority of the voting members of that council. 16 U.S.C. § 1854(h). NMFS has authority to prepare its own fishery management plan or amendment if a council fails to develop and transmit a plan or amendment within a reasonable period of time. 16 U.S.C. § 1854(c). NMFS is also responsible for annually reporting to Congress on the status of fisheries subject to management under the Magnuson-Stevens Act and determining whether any fishery is approaching a condition of being overfished. 16 U.S.C. § 1854(e). If a fishery is, at any time, determined as overfished, NMFS must notify the appropriate council and request that action be taken to end overfishing. Within one year, either NMFS or the council must prepare a plan or amendment to end the overfishing and rebuild the affected stocks of fish.

NMFS has the general responsibility to carry out any fishery management plan or amendment that has been approved. NMFS is given the authority to publish any regulations that may be necessary to carry out its responsibilities under the Magnuson-Stevens Act. 16 U.S.C. § 1855(d). Finally, NMFS is responsible for enforcement of the Magnuson-Stevens Act and all implementing regulations. 16 U.S.C. § 1861(a).

NMFS cannot approve any fishery management plan that is not consistent with Magnuson-Stevens Act and other applicable law. Thus, as a practical matter, the Council may recommend any fishery management measure it pleases, even measures that do not satisfy either the Magnuson-Stevens Act or other applicable law. However, if it does, NMFS is obligated to disapprove any such measure. Consequently, responsible implementation of the Magnuson-Stevens Act requires a council to make certain that its recommended measures are consistent with the Magnuson-Stevens Act and all other applicable law at the time it makes its recommendations to NMFS. Failure to ensure that the preparation of a fishery management measure is consistent with other applicable law is likely to be both a violation of the Magnuson-Stevens Act and of the other applicable statute. For example, a fishery management measure that has not been properly reviewed pursuant to the procedural requirements of NEPA or that is likely to result in jeopardy to a species listed under the ESA cannot be approved by NMFS and will be found unlawful in court, if they were. And, with respect to whether a particular plan or amendment is so consistent, the judgment of NMFS predominates over the council's because the statutory authority to make the judgment call was given to the Secretary of Commerce by Congress.

The North Pacific Fishery Management Council is composed of 15 members; 11 voting and 4 non-voting. Seven of the voting members are appointed by the Secretary of

Commerce upon the recommendation of the governors of Alaska and Washington. The governors must submit three names for each vacancy occurring on the Council and may indicate a preferred choice. The Governor of Alaska nominates candidates for five seats, the Governor of Washington two seats. Each member is appointed to a three-year term and may be reappointed, but may not exceed three consecutive terms. There are four mandatory voting members; they are the leading fisheries officials from the states of Alaska, Washington and Oregon and the Alaska Regional Director for the National Marine Fisheries Service. The four non-voting members are the Executive Director of the Pacific States Marine Fisheries Commission, the Area Director for the U.S. Fish and Wildlife Service, the Commander of the 17th Coast Guard District, and a representative from the U.S. State Department. From the voting membership, the Council elects a Chairman and Vice-Chairman to serve one-year terms.

The Council meets five to six times each year, four times in communities around Alaska, and once in Washington or Oregon. The Council's staff of fifteen resides in Anchorage, Alaska.

The Council receives advice each meeting from its Advisory Panel and Scientific and Statistical Committee. The NPFMC's Advisory Panel is made up of people who have interest in the fisheries. Membership varies, and the Council appoints membership every year, varying from 20-23 members representing all aspects of Alaska's fisheries: the seafood processing industry, CDQ groups, environmental interests, commercial fishermen, recreational fishermen and others. Regional membership is also considered. These members may be reappointed or replaced by the Council annually at their December Council meeting.

The Council's Scientific and Statistical Committee is also appointed by the Council yearly, and is made up of biologists, economists, and sociologists to provide recommendations and assist the Council.

The Guidelines for Fishery Management Plans (602 Guidelines) published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each fishery management plan (FMP). The SAFE reports for the groundfish fisheries managed by the NPFMC) are compiled by the respective Plan Teams from chapters contributed by scientists at NMFS' Alaska Fisheries Science Center & and the Alaska Department of Fish and Game (ADF&G). These SAFE reports include separate stock assessment and fishery evaluation sections. The stock assessment section includes recommended acceptable biological catch (ABC) levels for each stock and stock complex managed under the FMP. The ABC recommendations, together with social and economic factors, are considered by the Council in determining total allowable catches (TACs) and other management strategies for the fisheries.

The Council has many committees to assist in the collection and evaluation of information relevant to the development of any fishery management plan or plan amendment for a fishery. At the time of writing, the Council's committees included the following:

- Community QS Purchase Implementation Team

- Council/Board of Fisheries Joint Protocol Committee
- Council Executive Committee
- Crab Interim Action Committee
- DPSEIS Steering Committee
- Ecosystem Committee
- Enforcement Committee
- Essential Fish Habitat Committee
- Finance Committee
- Fur Seal Committee
- Halibut Charter IFQ Implementation (Idle)
- IFQ Implementation Committee
- IRIU Technical Committee
- Magnuson-Stevens Act Reauthorization Committee
- Non-Target/Other Species Committee
- Observer Advisory Committee
- Pacific Northwest Crab Industry Advisory Committee
- Steller Sea Lion Mitigation Committee
- U.S.-Russia International Committee
- VMS Committee

The Council takes up a wide range issues involving Alaska's fisheries (including many issues having nothing to do with pollock). Some issues occur annually, like setting the total allowable catch for each species and area; some are a result of an individual or group's request or proposal. After a proposal is presented and the Council reviews it, it may go to a committee where alternatives and options are drafted. The Council may then initiate an analysis of the proposal. This analysis examines the impacts to the fisheries, to the economics of communities, the effects on the ecosystem, and how the proposed changes would affect the current way the fisheries operate.

Analysis goes through several reviews and modifications. Decisions to change, select, or otherwise modify the proposal are made my recorded vote in the council in a public forum after public comment. Final decisions then go to the Secretary of Commerce for a second review, public comment, and final approval. Decisions must conform with the

Magnuson-Stevens Act, the National Environmental Policy Act, Endangered Species Act, Marine Mammal Protection Act, Regulatory Flexibility Act, and other applicable law including several executive orders. Regulatory changes may take up to a year or longer to implement, particularly if complex or contentious.

The North Pacific Fishery Management Council has prepared and implemented five fishery management plans (FMPs) for fisheries off Alaska. Each FMP encompasses regional fisheries for certain species, as listed below.

Bering Sea/Aleutian Islands Groundfish FMP: This FMP includes all species of groundfish (pollock, cod, flatfish, sablefish, rockfish, etc.) fished commercially by vessels using trawl, longline, pot, and jig gear. In season management of these fisheries is done by NMFS in Juneau.

Groundfish of the Gulf of Alaska FMP: The Groundfish of the Gulf of Alaska FMP essentially mirrors the BSAI groundfish FMP. Some commercial species (black rockfish, blue rockfish, lingcod) are not included in the FMP, but are instead managed by the State of Alaska.

Bering Sea/Aleutian Islands King and Tanner Crab FMP: This FMP includes all species and fisheries for king and Tanner crab (red, blue, and brown king crab, Tanner crab, and snow crab). In season management of these fisheries is provided by ADF&G in Kodiak.

Alaska Scallop FMP: This draft FMP was developed to control fishing effort in the weathervane scallop fishery. Only 9 vessels are permitted under a license limitation program. In season management of the fishery is provided by ADF&G in Kodiak.

Salmon Fisheries in the EEZ off the Coast of Alaska: The Salmon FMP was developed to prohibit fishing for salmon in the EEZ except by a limited number of vessels using troll gear. All management of the salmon fisheries is deferred to the State of Alaska.

Pollock Related Litigation

The National Marine Fisheries Service has been taken to federal court regularly over the last decade in a series of cases challenging the agency's compliance with NEPA and ESA in the context of its management of the BSAI pollock and other groundfish stocks. Most of the litigation has taken place before the United States District Court for the Western District of Washington, located in Seattle (hereafter "federal court" or "court") and has been initiated by national and regional marine resource conservation groups. The fishing industry has typically joined in the litigation, usually in the posture of a co-defendant with the United States.

NMFS and the fishing industry have prevailed in a number of proceedings, but the conservationists have won several major actions that have led to significant changes for the management system. The process has been notably contentious and has consumed tremendous resources from all parties. There is no question, however, that the conservation community's access to the federal courts, and success therein, has, as described below, served as a powerful transformational force in North Pacific pollock management.[24]

In late 2002, ruling on the latest challenge by conservation groups to NMFS' efforts to manage for Steller sea lion conservation, the federal court observed:

> This case arises out of the attempt to regulate this fishery in light of the presence of an endangered species and the legal dictates of the ESA and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Act), 16 U.S.C. § 1801 et seq. Regulation of this fishery under these dictates has been far from a simple task, as the extensive litigation history of this case, extending back to the filing of the original complaint on April 15, 1998, and the voluminous administrative record, comprising more than 50,000 pages of documents, amply demonstrate. It is clear to the Court that a tremendous amount of time, energy, and resources have been expended in attempting to end the decline of the western population of Steller sea lions, while maintaining the fishing industry that is so important to the region, on the basis of ever-changing scientific knowledge (Halpern, 2002).[25]

One experienced observer of NMFS put the string of cases in this context:

> What is important to note about environmental group litigation is that while it may be new for the National Marine Fisheries Service, it is not new in the history of natural resource management. NMFS is about 10 years behind the U.S. Forest Service, National Park Service and other resource managers in suffering through litigation, particularly challenges to its analysis of the impacts of fishery management actions required in the Magnuson-Stevens Fishery Conservation and Management Act, National Environmental Policy Act, Regulatory Flexibility Act and various Executive Orders. The agency finds itself in what one NEPA expert has described as "Stage II" in the evolution toward compliance, a stage that occurs after numerous court orders and injunctions, where money is made available for contractors and consultations, detailed prescriptions emerge from general counsel, and the agency does enough to demonstrate that it is trying to respond to litigation. NEPA managers in these other agencies can tell you that what the Fisheries Service is experiencing now is familiar ground, and that there are ways to improve performance, comply with the laws, and get resource management done. We can learn from the experiences and approaches tried elsewhere, even if it seems at times the only relevant lesson is "you are not alone."
>
> The good news is that the National Marine Fisheries Service is no longer in "Stage I," or denial that NEPA applies to fishery management actions. The agency has

[24] The conservation stakeholders' comments on the draft assessment report state "The team should find significant and troubling the fact that litigation was the precipitating factor that caused any positive change in the management of the pollock fisheries." As discussed at many points in this report, the team did, indeed, find the role of litigation significant and troubling. It is clearly not an ideal tool for improving the management of the fishery, but there is no doubt as to its influence.

[25] Greenpeace v. NMFS, 237 F.Supp. 2d 1181, 1184-85 (Dec. 17, 2002 order).

> undertaken numerous activities to tap experience of other resource agencies, use the planning and brainstorming ingenuity of its own and council staff, and employ resources provided by Congress to expand training in NEPA and other procedural requirements, improve consistency in document preparation and get tough on the quality of decision record that will be approved (Iudicello, 2002).

NEPA Litigation

Several of the proceedings deserve detailed discussion because of their ultimate impacts on the management system. The most important involves litigation brought by conservation groups challenging NMFS compliance with NEPA in its preparation of FMPs for the North Pacific groundfish fisheries. On July 13, 1999, the United States District Court for the Western District of Washington held that "NEPA require[s] preparation of a programmatic environmental impact statement analyzing the environmental impacts of the [BSAI and GOA] FMPs as a whole on the North Pacific ecosystem" and that NMFS' first attempt to prepare such a statement was inadequate as a matter of law.[26] In a Remand Order dated August 6, 1999, the court ordered NMFS to prepare a "comprehensive programmatic SEIS that defines the federal action under review as, among other things, all activities authorized and managed under the Fishery Management Plans (FMPs) and all amendments thereto, and that addresses the conduct of the Gulf of Alaska (GOA) and Bering Sea/Aleutian Islands (BSAI) groundfish fisheries and the FMPs as a whole."[27] The court required the agency to file written progress reports regarding the progress of its NEPA analysis every 60 days and retained continuing jurisdiction over the matter.[28]

NMFS is working to comply with the court's order, and, after an initial false-step that the agency acknowledged and corrected, is in the midst of preparing what appears to the assessment team to be one of the more complex NEPA analyses ever developed by federal agencies.[29] That analysis, the PSEIS, is a complex review of alternative management philosophies for the groundfish fisheries. In effect, the agency has taken a step back and asked the fundamental question: "Taking into account all of our legal authorities, what are the principal goals and objectives toward which we have the option of managing these fisheries?" The PSEIS includes four basic alternatives which represent a set of choices ranging from status quo management to aggressive harvest maximization to maximum ecosystem protection. The PSEIS will include discussions of the various environmental impacts and

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[26] Greenpeace v. NMFS, 55 F.Supp.2d 1255, 1276 (W.D. Wash. 1999).

[27] Greenpeace v. NMFS, Remand Order at 3 (August 6, 1999).

[28] Id. at 4.

[29] http://www.fakr.noaa.gov/sustainablefisheries/seis/2nddraftalts.pdf

other factors, including socioeconomic considerations, pertinent to each of the four alternatives.[30]

Alternative 1 would essentially maintain the current management approach, which NMFS summarizes this way:

> Continue to work toward the goals of maintaining sustainable fisheries, protecting threatened and endangered species, and to protect, conserve, and restore living marine resource habitat through existing institutions and processes. Continue to manage the groundfish fisheries through the current risk-averse conservation and management program that is based on a conservative harvest strategy. Under this management strategy, fishery impacts to the environment are mitigated as scientific evidence indicates that the fishery is adversely impacting the ecosystem. Management decisions will utilize the best scientific information available; the management process will be adaptive to new information and reactive to new environmental issues; incorporate and apply ecosystem-based management principles; consider the impact of fishing on predator-prey, habitat, and other important ecological relationships; maintain the statutorily mandated programs to reduce excess capacity and the race-for-fish; draw upon federal, state, and academic capabilities in carrying out research, administration, management, and enforcement; and consider the effects of fishing and encourage the development of practical measures that minimize bycatch and adverse effects of essential fishing habitat. This strategy is based on the assumption that fishing does produce some adverse impact on the environment and that as these impacts become known, mitigation measures are developed and FMP amendments are implemented. Issues will be addressed as they ripen and are identified through Council staff tasking and research priorities. The Council will continue to use the National Standards as its guide in practicing adaptive management and responsible decision-making and to consistently amend FMPs accordingly.

Alternative 2 would amend the current FMPs to establish a more aggressive harvest strategy while still preventing overfishing of target groundfish stocks.

> The goal would be to maximize biological and economic yield from the resource. Such a management approach will be based on the best scientific information available, take into account individual stock and ecosystem variability; involve and be responsive to the needs and interests of affected states and citizens; continue to work with state and federal agencies to protect threatened and endangered species; maintain the statutorily mandated programs to reduce excess capacity and the race-for-fish; draw upon federal, state, and academic capabilities in carrying out research,

[30] The conservation stakeholders' comments on the draft assessment report's application of Principle 3 include many criticisms of the revised draft PSEIS that was released by NMFS almost a year after the assessment team met with the conservation stakeholders, NMFS and Council personnel to discuss the status and direction of the document. At the time, we encountered cautious optimism among all the parties that the PSEIS would mark serious, substantive progress in management of the fishery and our assessment reflects that optimism. It appears from the conservation groups' comments, however, that the PSEIS was released in a form that they consider unsatisfactory and not in compliance with the National Environmental Policy Act or applicable court orders. It seems reasonable to expect that the PSEIS will be challenged in federal court in 2004 or 2005. The substance and legal fate of the PSEIS will necessarily factor very heavily in any future reviews of the fishery pursuant to the MSC Principles and Criteria.

> administration, management, and enforcement; and consider the effects of fishing and encourage the development of practical measures that minimize bycatch and adverse effects of essential fishing habitat. This strategy is based on the assumption that fishing does not have an adverse impact on the environment except in specific cases.

Alternative 3 would accelerate precautionary management measures through community or rights-based management, ecosystem management principles, increased habitat protection and additional bycatch constraints:

> This policy objective seeks to provide sound conservation of the living marine resources; provide socially and economically viable fisheries and fishing communities, minimize human caused threats to protected species; maintain a healthy marine resource habitat; and incorporate ecosystem considerations into management decisions. This policy recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management. This policy will utilize and improve upon existing processes to involve a broad range of the public in decision-making. Further, these objectives seek to maintain the balanced goals of the MSA and other MSA provisions, the National Standards and the requirements of other applicable law, based on the best scientific information available. This policy takes into account the National Academy of Science's Sustainable Fisheries Policy Recommendations. Under this approach, more conservative mitigation measures will be taken to respond to social, economic or conservation needs, or if scientific evidence indicates that the fishery is negatively impacting the environment.

Alternative 4 would adopt a highly restrictive approach to scientific uncertainty in which the burden of proof is shifted to the user of the resource to demonstrate that the intended use will not have a detrimental effect on the environment. The alternative would:

> Modify restrictive conservation and management measures as additional, reliable scientific information becomes available. Establish a fishery conservation and management program to maintain ecological relationships between exploited, dependent and related species as well as ecosystem processes that sustain them. Management decisions assume that science cannot eliminate uncertainty and that action must be taken in the face of large uncertainties, guided by policy priorities and the strict interpretation of the precautionary principle. Management decisions will involve and be responsive to the public but minimize industry and community concerns; incorporate and apply strict ecosystem principles; address the impact fishing on predator-prey, habitat and other important ecological relationships in the marine environment; draw upon federal, state, academic and other capabilities in carrying out research, administration, management, and enforcement; implement measures that avoid or minimize bycatch; and include the use of explicit allocative or cooperative programs to reduce excess capacity and allocate fish to particular gear types and fisheries. This strategy is based on the assumption that fishing does produce adverse impacts on the environment but due to lack of information and uncertainty, we know little about these impacts. This strategy would result in a number of significant

> changes to the FMPs that would significantly curtail the groundfish fisheries until more information is known about the frequency and
> intensity of fishery impacts upon the environment. Expanded research and monitoring programs will fill critical data gaps. Once more is known about fishery effects on the ecosystem, scientific information will be used to modify and relax the precautionary measures initially adopted.

ESA Litigation

Conservation stakeholders have repeatedly challenged NMFS' compliance with the Endangered Species Act, asserting, in essence, that BSAI FMPs failed to protect the federally listed Steller sea lion.

Under the Magnuson-Stevens Act, the North Pacific Council prepares FMPs that regulate all aspects of the commercial fisheries in the North Pacific ecosystem.[31] The promulgation of FMPs constitutes "agency action" under the ESA. The ESA imposes upon NMFS the duty to ensure that any proposed action by the North Pacific Council does not "jeopardize" the continued existence of any threatened or endangered species or result in the destruction or "adverse modification" of the critical habitat of such species. "Jeopardize" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."[32] "Adverse modification" means "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species."[33]

A species is "endangered" when it is in danger of extinction throughout all or a significant portion of its range.[34] The designated critical habitat of a species is intended to protect those geographical areas occupied by the species, which contain the physical and biological features essential for the survival and recovery of the species.[35]

In order to avoid jeopardy and adverse modification, the ESA requires that the "action" agency consult with an "expert" agency to evaluate the effects a proposed agency action may have on a listed species. In the case of the Steller sea lion, NMFS' Office of Sustainable Fisheries is the "action" agency and NMFS' Office of Protected Resources is the "expert" agency. If the action agency determines that a proposed agency action may adversely affect a listed species, the action agency is required to perform a formal consultation with the expert

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[31] See 16 U.S.C. §§ 1852 (a) (1) (G), (h).

[32] 50 C.F.R. § 402.02.

[33] Id. See 16 U.S.C. § 1536(a) (2).

[34] 16 U.S.C. § 1532(6).

[35] 16 U.S.C. §§ 1532(3), 1532(5) (A) (i); See 58 Fed. Reg. 45,269 (August 27, 1993) (final rule designating Steller sea lion critical habitat).

agency.[36] The final product of a formal consultation is a biological opinion that states the expert agency's conclusions regarding the possibility of any jeopardy or adverse modification that the proposed action would cause.[37] When jeopardy or adverse modification is found, the expert agency must propose "reasonable and prudent alternatives" (RPAs), by which the action can proceed without causing jeopardy or adverse modification.[38]

In April 1998, certain conservation groups filed suit in the U.S. District Court for the Western District of Washington initially alleging that NMFS was implementing a North Pacific fishery management plan without a comprehensive Environmental Impact Statement or adequate biological opinions addressing the effect of the fisheries on the Steller sea lion. The conservation groups specifically challenged biological opinions issued by NMFS in January 1996 for the BSAI and in March 1998 for the GOA. On October 9, 1998, the court stayed the pending litigation because NMFS represented to the court that it was in the process of preparing a Supplemental Environmental Impact Statement and a new biological opinion that would address all federally managed fisheries in the BSAI and GOA. In December of 1998, NMFS issued two biological opinions addressing the potential effects of the North Pacific groundfish fisheries on the Steller sea lion. The first opinion (BiOp1) discussed the effects of the pollock and Atka mackerel fisheries on the Steller sea lion. The second opinion (BiOp2) considered the effects of the FMP in their entirety. The conservation groups challenged both of the biological opinions.

In BiOp1, NMFS concluded that the mackerel fishery was not likely to jeopardize the Steller sea lion population but that the pollock fishery was likely to result in jeopardy. The court upheld these findings under the ESA.[39] However, the court ruled that the RPA adopted by the North Pacific Council and approved by NMFS with respect to the pollock fishery was arbitrary and capricious and remanded to NMFS for preparation of a revised RPA.[40] In October 1999, NMFS issued Revised Final Reasonable and Prudent Alternatives for the pollock fishery.

In BiOp2, NMFS analyzed the effects of its entire fishery management scheme on the Steller sea lion. The court ruled on January 25, 2000 that BiOp2 was inadequate under the ESA because it was not a comprehensive opinion and failed to analyze the full scope of the FMP.[41] Thereafter, on July 19, 2000, the court enjoined all groundfish trawl fishing within Steller sea lion critical habitat in the oceans of the BSAI and GOA west of 144 [degrees] W longitude. The court concluded that NMFS was in continuing violation of the ESA and plaintiffs had

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[36] 50 C.F.R. § 402.14(a).

[37] 16 U.S.C. § 1536(a) (2).

[38] 16 U.S.C. § 1536(b) (3) (A).

[39] Greenpeace (I), 55 F. Supp. 2d 1248, 1269 (W.D. Wash. 1999).

[40] Id. at 1276.

[41] Greenpeace (II), 80 F. Supp. 2d 1137, 1150 (W.D. Wash. 2000).

proven both "irreparable harm" and that continued fishing posed "a reasonably certain threat of imminent harm" to the Steller sea lion.[42]

On November 30, 2000, NMFS issued a new biological opinion on the North Pacific groundfish fisheries (FMP BiOp) and the court lifted the injunction against fishing. The FMP BiOp also concluded that the North Pacific Council's FMP then in existence was likely to jeopardize endangered Steller sea lions and adversely modify their designated critical habitat. Accordingly, NMFS included an RPA to the FMP in the FMP BiOp. The RPA contained within the FMP BiOp imposed a series of heightened regulations on the North Pacific fisheries including the complete closure of two-thirds of Steller sea lion critical habitat to all fishing for pollock, Pacific cod, and Atka mackerel, seasonal catch limits within the remainder of critical habitat to spatially distribute the fishing, and a system of four seasons inside critical habitat and two seasons outside critical habitat to temporally redistribute the fishing.

After the issuance of the FMP BiOp, and in response to sharp criticism from the fishing industry and others, Alaska's senior U.S. Senator amended an unrelated piece of funding legislation to include what is generally called a "rider" which, in this case, sharply limited the implementation of the RPA.[43] The legislation required NMFS and the North Pacific Council to consult and review the measures necessary to protect the Steller sea lion and its critical habitat. As a result of this legislation, the North Pacific Council proposed a number of changes to the RPA in the FMP BiOp to be implemented through Magnuson-Stevens Act procedures (Amended RPA). The Amended RPA was developed by a North Pacific Council-appointed committee (the "RPA Committee") of fishery interests, scientists, and others, including conservation group representatives. The Amended RPA reopened areas of critical habitat to fishing previously closed by the RPA, eliminated the four season dispersal of fishing within critical habitat except for pollock, and removed many of the spatial distribution measures implemented in the RPA.

Because of the passage of legislation, and its effect on implementation of the RPA in the FMP BiOp, the parties agreed to temporarily stay litigation. NMFS reviewed the Amended RPA and issued a new biological opinion on October 19, 2001 (2001 BiOp).[44] The 2001 BiOp was limited to a review of the Amended RPA and did not reconsider the original jeopardy and adverse modification conclusion of the FMP BiOp. The 2001 BiOp found that the Amended RPA was not likely to jeopardize the continued existence of the western population of Steller sea lions or adversely modify their critical habitat.

The conservation groups challenged the 2001 BiOp, alleging a number of infirmities. In December 2002, the court issued an opinion that sided with NMFS on most of the claims but found for the plaintiffs on their fundamental complaint which was that NMFS had not evaluated the effects of the proposed level of fishing on critical habitat and the Steller sea lions. The court wrote: "Without an analysis of how the fishing within critical habitat impacts

[42] Greenpeace (III), 106 F. Supp. 2d 1066, 1080 (W.D. Wash. 2000).

[43] Consolidated Appropriations Act, 2001, Pub. L. No. 106-554, § 1(a) (4), [Div. A, § 209], 114 Stat. 2763, 2763A-176 (2000).

[44] http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/final.htm

the differing zones of importance, or an explanation in the record of why such an analysis was not required, it is not possible for the Court to find that the agency has "articulated a rational connection between the facts found and the choice made." [Citations omitted] In short, the 2001 BiOp does not contain a viable analysis of cause and effect, which is exactly what the ESA requires. This failure is fatal to the 2001 BiOp."[45] The court remanded the 2001 BiOp to NMFS to be revised to come into compliance with the ESA.

NMFS, the industry, and the conservation stakeholders recently agreed to settle pending litigation on terms that have been adopted by the federal court and entered as an order to the parties, effective April 1, 2003.[46] The order covers all of the significant NEPA and ESA compliance matters that have been the subject of recent disputes among the parties. The settlement among the parties requires NMFS to bring the management of the North Pacific groundfish fisheries into full compliance with NEPA and the ESA (as to the issues under litigation) within certain timeframes set for this year (2003) and in 2004. The agency agreed to complete the revised analysis of Steller sea lion RPAs not later than June 30, 2003, and to issue the final PSEIS and a final agency decision based on it not later than September 1, 2004.

Essential Fish Habitat Litigation

Conservation stakeholders also successfully challenged NMFS as to the agency's compliance with the essential fish habitat (EFH) provisions of the Magnuson-Stevens Act in the context of a number of fisheries around the country, including certain amendments to the FMPs for BSAI/AI and GOA groundfish pertaining to protection of EFH.[47]

Plaintiffs argued that FMP amendments did not contain an adequate assessment of the effects of fishing and fishing gear on EFH, failed to identify and assess potential measures to minimize adverse effects of fishing on EFH, and failed to impose practicable measures to minimize the impact of fishing activities on EFH. On September 14, 2000, the U.S. District Court for the District of Columbia issued an opinion and order in the EFH lawsuit, finding that the FMP amendments on EFH violated NEPA and ordered NMFS to perform a new and thorough EA or EIS on the amendments. The court specifically found that the agency had failed to consider all relevant and feasible alternatives and failed to fully explain the environmental impact of the proposed action and alternatives. The parties to the EFH litigation reached a settlement with the agency, setting a compliance schedule for EFH-related environmental impact statements and associated management actions under the Magnuson-Stevens Act.[48]

Application of Scoring Indicators to Fishery Information

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[45] Greenpeace v. NMFS, 237 F.Supp. 2d 1181, 1203 (Dec. 17, 2002 order); posted on the web at http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/Zilly121802.pdf.

[46] A copy of the order is posted on the web at: http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/ClosingCaseFiling.pdf

[47] AOC v. Daley, 183 F.Supp.2d 1, 20-21 (D.D.C. 2000).

[48] http://www.nmfs.noaa.gov/habitat/habitatprotection/newenvironmentalimpactstatements.htm

Application of Scoring Indicators to Fishery Information

SCS Criterion 1

The management system has a clearly defined scope capable of achieving MSC Principles and Criteria and includes short and long-term objectives, including objectives for managing ecological impacts of fishing, consistent with a well managed fishery.

The pollock fishery management plans have included goals and objectives since the outset of the fishery, and those goals extend beyond just the target species and the economic benefits of their yields. Most of the biological goals, and many of the social and economic goals, have measurable objectives.

The North Pacific Council, like other councils, has only recently begun to examine policy goals that are alternatives to sustainable fishing, economically viable fishing communities, and other such traditional, fishery-focused goals. In their recent actions to revise the PSEIS, the North Pacific Council and the NMFS are spending time analyzing an array of objectives ranging from those that would accomplish solely ecosystem protection objectives to those that would achieve fishery maintenance targets. Fishery management council consideration of goals and objectives that are not directly related to fish, fishing, and fishing communities is a new area of endeavor, and one that recognizes a stewardship role beyond fishery management and allocation. The North Pacific Council is one of the first venturing into this arena (Bernstein et al., 2002).

Many of the individuals who commented to the assessment team raised questions about the track record of the management system in identifying and pursuing clear objectives for management of the fishery. Indeed, objective-setting is one of the most often criticized elements of the U.S. fishery management system. The National Research Council (National Research Council,1999; National Research Council, 1996; National Research Council, 2003). and others have cautioned that it is critical to have all stakeholders participating in the process to develop objectives for a fishery. The Heinz Center points out that fishery management councils rarely take time to set objectives and are too burdened to do more than react to short-term problems. These and other sources advocate developing concrete, measurable objectives that go beyond biological measures, and that would incorporate the kind of planning that takes community, cultural, societal, and economic goals into account as well (Bernstein et al., 2002).

Indicator 1.1 The management system incorporates and applies an adaptive and precautionary exploited stock strategy *[Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]*

Elements considered in scoring include

- Clear long-term objectives
- Application of precautionary approach
- Use of best scientific information
- Explicit catch control rule (e.g., ABC, TAC)

- Annual assessment of stocks

100 Scoring Guidepost

- The management plan includes long-term stock management objectives that are explicit and consistent with MSC Principles and Criteria
- The harvest strategy, including catch control rule, is explicitly precautionary, accounting for variances in survey estimates, uncertainties in stock assessment advice, and other risk factors
- Annual assessments are undertaken for all components of the population, based on sound long-term data, including data developed prior to inception of the pollock fishery, if any

80 Scoring Guidepost

- Management objectives seek to maintain stocks at high levels of productivity
- The harvest strategy, including catch control rule, is explicitly precautionary
- Annual assessments are based on best available information from ongoing data collection efforts.

60 Scoring Guidepost

- There is no agreed harvest control rule in place
- The harvest control strategy does not take account of uncertainties in stock status
- The harvest control strategy can not be shown to be precautionary
- The harvest control strategy is not applied consistently or is overridden

SCORE 95

The applicant provided an extensive case to the assessment team on this Indicator, although most of the information here is derivative of the applicant's submission with regard to MSC Principle 1. The applicant's submission (At-Sea Processors Association, 2002) is therefore restated briefly for this Indicator.

There is broad agreement among the comments submitted to the assessment team that the management system uses sophisticated stock assessment methods and harvest control rules. There is far less agreement on the question whether the system reflects a precautionary approach. The applicant and many agency officials are of the view that the system incorporates a clear precautionary approach to fishery management because it observes the following principles and practices:

- annual stock assessments based on surveys and fishery dependent observer data;
- peer-reviewed scientific advice;
- defined overfishing levels;
- conservative harvest levels;
- minimum stock size threshold requirement for allowing a fishery;

- comprehensive observer coverage; and
- real-time catch reporting and total catch accounting.

The applicant points to the thorough discussion of pollock stock assessments, including modeling and proposed exploitation rates, in the annual Stock Assessment and Fishery Evaluation (SAFE) reports prepared by the Groundfish Plan Teams for the BSAI, and the subsequent peer review of the SAFE reports by the North Pacific Council's Scientific and Statistical Committee (SSC) in meetings that are open to the public and at which public testimony is received and considered (At-Sea Processors Association, 2002). The applicant observes that the North Pacific Council sets the overfishing, ABC and TAC levels on an annual basis after considering the Plan Team findings, the advice of the North Pacific Council's SSC, and receiving public testimony.

In the applicant's view, the North Pacific Council has provided empirical evidence that the management system observes a precautionary approach by consistently maintaining BSAI harvest levels well below both the ABC and overfishing levels recommended through the Plan Team and SSC process. The applicant directed the assessment team to a position paper prepared by the North Pacific Council (North Pacific Fishery Management Council,1999) that notes, "Of 317 ABC decisions for 1987-1999, the Council's ABC exceeded the SSC's recommendation only twice, and then only to accommodate legitimate differences between the SSC and stock assessment scientists."

The applicant advised the assessment team that fishery management regulations require that the fishery closes when the TAC level is reached. The federal fishery observer program and the fishery management rules ensure accurate, real-time catch accounting and vessel monitoring. All catch, whether taken as part of the directed pollock fishery or as bycatch in other fisheries, and whether retained or discarded, is counted against the TAC.

The conservation stakeholders advised the assessment team that, in their view, the North Pacific Council and NMFS do not employ an appropriately precautionary exploited stock strategy (Marz, S. and K. Stump, 2002). The stakeholders argue that the strategy fails to adequately consider the multiple sources of uncertainty and unknown information inherent to stock assessments in setting TAC and ABC levels. The stakeholders note that intense spatial and temporal concentration of the fishery (much of it in Steller sea lion critical habitat) has been accompanied by a pattern of spawning stock declines indicative of serial depletion for pollock in the Shelikof Strait and Aleutian Islands.

The conservation stakeholders noted that estimates of stock biomass are uncertain and subject to large error bounds which can be compounded by modeling parameter errors in the stock assessment advice as well as other sources of uncertainty over which managers have no control, such as environmental variability and predator-prey dynamics. The process of setting single-species ABCs does not consider the effect on competing top predators and the food web of fishing at a level that seeks to reduce fully exploited spawning stocks by 60% on average, by design. This exploitation strategy simply assumes that any recruitment of juvenile fish to the adult spawning stock above the theoretical replacement line necessary to maintain the adult population at a given stock size is a "surplus" for the fishery – with no consideration of effects on the exploited ecosystem (Marz, S. and K. Stump, 2002).

In the view of the assessment team, as discussed in much greater detail under the section of this report concerning MSC Principle 1, there is no question that the stock assessment performed for the Eastern Bering Sea pollock fishery is among the world's very best. The scientists involved in this work are recognized worldwide as leaders in their fields. The amount and quality of information is exemplary, as is the management system's commitment to continual improvement in the accuracy and precision of pollock stock assessment. However, the assessment team did point out under Principle 1 some deficiencies in the stock assessment with respect to the consideration of the impacts of Russian catches in particular, and also noted that some elements of the harvest control laws were in need of further testing and possible modification. The assessment for the Aleutian Islands is much weaker than for the Eastern Bering Sea. The assessment team also recognizes that, as pointed out under Principles 1 and 2, the level of incorporation of ecosystem considerations into the estimates of ABCs is still in need of improvement to attain the precautionary nature espoused by the fishery. The overall score reflects the strong points listed above, taking into account some of the weaknesses already identified.

<u>Indicator</u> 1.2 The management system incorporates and applies an effective strategy to manage ecological impacts of fishing *[Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]*

Elements considered in scoring include:

- Clear long-term objectives
- Application of precautionary approach
- Consideration of impacts on non-target species and habitats over time and space

100 Scoring Guidepost

- The management system includes a management plan with clear long-term objectives for managing ecological impacts of fishing that are explicit and consistent with MSC Principles and Criteria
- The management plan includes ecosystem components and is explicitly precautionary, accounting as appropriate for uncertainty.
- The management plan contains ecosystem components that take into account all significant (identified or estimated) ecological impacts of the fishery, including but not limited to food competition, disruption of prey fields, disruption of foraging behavior, disruption to animals, and alterations in food webs and habitats.
- The management plan includes mechanisms (such as representative areas set aside as no-take zones) to minimize, where appropriate, identified impacts from fishing.

80 Scoring Guidepost

- The management system includes a management plan that explicitly takes into account ecological impacts of the fishery

- Regulation of the fishery to manage ecological impacts of fishing is precautionary
- Assessments (empirical or other) of likely significant ecological impacts of fishing are undertaken on a regular basis
- Control mechanisms are used where appropriate to minimize impacts.

60 Scoring Guidepost

- The management system does not take into account or attempt to limit significantly the adverse ecological impacts of the fishery.

SCORE 75

The assessment team received a considerable body of information pertinent to this Indicator, most of which is discussed in connection with Principle 2.

The team believes that the management system has made significant progress in this area, and much more than many other fisheries of a similar size and scale. However, the assessment team also believes that the management system's use of ecosystem-based approaches is an area where objective-setting could be significantly improved, particularly in terms of how planners incorporate ecosystem objectives into fishery management plans and into the calculation of ABCs. Several recent reports are contributing to efforts to begin this process. An emerging consensus among scientists and managers is that moving toward ecosystem-based fishery management will require a series of incremental steps, not the least of which is refining and improving single-species management and habitat protection (Sissenwine and Fluharty, 2002).

The North Pacific Council has been reviewing broader, ecosystem-level information since 1994, when a new Ecosystem Considerations chapter was added to the groundfish Stock Assessment and Fishery Evaluation Report. Originally, this chapter contained summaries of recent ecosystem research, including objectives for ecosystem-based management, as well as status and trends information on protected species.[49]

Several years ago, NMFS suggested that the content of this chapter be standardized and that it include information on the status and trends of the physical oceanography and climate, biological oceanography, habitat and effects of fishing research, marine pollution, predator-prey interactions, forage fish and other non-target species, and marine mammals and seabirds, as well as discussion of the possible factors affecting trends (Berstein et al., 2002).

As described by NMFS' lead scientist on North Pacific ecosystem management matters (Livingston, 2001), the two-part purpose behind this suggestion was to "1) bring the results of ecosystem research efforts to the attention of stock assessment scientists and fishery managers in order to provide stronger links between ecosystem research and fishery management, and 2) bring together many diverse research efforts into one document, which would spur new

[49] http://www.fakr.noaa.gov/npfmc/ecosystm/ecobased.htm#Ecosystem%20Considerations

understanding of the connections between ecosystem components and the possible role that climate, humans, or both may have on the system."

NMFS and the North Pacific Council are currently working together to expand the chapter on Ecosystem Considerations to include ecosystem status and trends information, and management indicators. Future work will focus on developing more quantitative management objectives and ecosystem indicators that will trigger pre-defined management actions. Current scientific research in this area will be critical to the Council's ability to develop the practical means to incorporate ecosystem considerations into fishery management decision-making. The Council's Ecosystem Committee, described below, has been charged with this task.

The applicant drew the assessment team's attention to an article prepared by a North Pacific Council member and Council staffs (Witherell, Pautzke, and Fluharty, 2000). The article focuses on the North Pacific Council's use of a precautionary approach in assessing fish stocks and setting conservative catch limits. The paper also summarizes regulatory measures to reduce discards and the incidental harvest of non-target species. There is also extensive discussion of the use of marine protected areas and implementation of management measures to protect marine mammal and seabird populations. The paper also contains the text of the North Pacific Council's draft ecosystem-based management policy to guide the Council's progress on further integrating ecosystem-based management into the groundfish management process.

The applicant noted that NMFS' Draft PSEIS is intended to update the long-term objectives of groundfish management by, among other things, analyzing and choosing among management alternatives emphasizing an ecosystem-based approach.

The applicant also emphasized that Appendix D of the annual SAFE report provides a comprehensive review of ecosystem considerations relating to the BSAI groundfish fisheries, including the pollock fishery. In addition, the North Pacific Council has created an Ecosystem Committee, chaired by University of Washington professor and Council member, David Fluharty, to guide the Council in short-term and long-term planning to further improve its approach to ecosystem-based management. Council members and stakeholders, including fishing industry members and members of environmental organizations, serve on the Ecosystem Committee.

The applicant cites as a clear example of the North Pacific Council's and NMFS' precautionary approach on ecosystem-based management issues the approach of managers to the Steller sea lion issue. Despite uncertainty over the causes of the sea lion's decline, the North Pacific Council recommended and the NMFS implemented far-reaching fishery management regulations designed to eliminate potential competition between foraging Steller sea lions and pollock, cod and Atka mackerel fishing vessels. Significant areas of sea lion habitat were closed to fishing.[50]

[50] APA at 5.

Other examples of the Council's emphasis on minimizing the effects of pollock fishing on non-target species and habitats cited by the applicant include Amendment 57 to the BSAI Groundfish FMP that prohibited the use of bottom trawl gear in the pollock fishery; bycatch reduction measures and area closures such as the Pribilof Islands Conservation Area, Bogoslof area closure, the Aleutian Islands closures and the restrictions on pollock catcher/processors fishing in the Catcher Vessel Operational Area (CVOA) during the summer/fall fishery, Amendment 21 to the GOA Groundfish FMP in 1990 that apportioned prohibited species catch (PSC) between gear types and seasons and established overfishing definitions; Amendment 19 implemented in 1991 that prohibited pollock roe stripping; Amendment 24 in 1992 that changed directed fishing standards to reduce halibut bycatch in trawl fisheries; Amendment 26 in 1992 that made permanent the bottom trawl closed areas first established by Amendment 18 in 1989; Amendment 44 in 1997 that refined overfishing definitions to more conservative levels; Amendment 45 in 1996 that split the pollock fishery into trimesters; Amendment 49 in 1997 to improve retention and utilization of overall catch; and Amendment 56 in 1999 that again revised overfishing definitions (At Sea Processors, 2002).

The conservation stakeholders (Marz and Stump, 2002) assert that the North Pacific Council and NMFS fail to adequately incorporate an effective strategy to manage the ecological impacts of fishing for groundfish in general and pollock specifically. Because the management system relies on a Maximum Sustainable Yield (MSY) "surplus production" theory to set single-species ABCs it does not incorporate the needs of predators or other ecosystem-level considerations into conventional single-species catch levels. As NMFS' own scientists explain, "The ABCs have generally been developed using single-species stock assessment philosophies . . . which maximize yield while preventing overfishing of each [managed] species, but do not explicitly account for trophic interactions with other taxa."

The stakeholders (Marz and Stump, 2002) noted that NMFS itself makes this point in the draft PSEIS: "Single species stock assessment procedures and exploitation strategies are used to determine annual levels of catch permissible under the Magnuson-Stevens Act and consistent with NMFS' National Fishery Standards and Guidelines. For the most part, other species' prey requirements for each exploited groundfish species are considered only to the extent to which they are captured within the natural mortality rate parameter, M, one of the most difficult parameters of a fish population to measure."

The conservation stakeholders advised the assessment team that the competitive pressure of MSY-based fishing strategies in the North Pacific is suggested by the decline since the 1970s of competing predators such as the Steller sea lion, harbor seal and some fish-eating seabird populations in the North Pacific, species known to rely on commercially exploited stocks of pollock, Atka mackerel, cod, salmon, herring and flounders. Surplus production theory also ignores the effects of disproportionate fishery exploitation of a few commercially important species and subsequent alterations of the community structure of species, effects suggested in the North Pacific by the declines of some large bottom-dwelling species (certain pollock stocks, crabs, rockfish) and apparent increases in others (arrowtooth flounder, sea stars, skates), which may also indirectly affect the availability of prey and carrying capacity at higher trophic levels. As stated by the conservation groups (Marz and Stump, 2002):

> The problem facing the Council and NMFS is that there is no clear policy framework or procedure within the conventional single-species management regime for considering non-economic values and adjusting single-species fishing strategies to address impacts on food webs, protected species, habitats, etc. Fishing rates and levels of catch that are deemed "conservative" relative to the conventional MSY yardstick may have considerable peripheral impacts on food webs and habitats that are not reflected in a simple comparison of catch to the estimated "biomass" of a target stock in the status quo TAC-setting process. Moreover, the assumption of "surplus" fails to consider overfishing in an ecosystem context. The mix of management measures to address pollock stock declines and impacts of the pollock fisheries on Steller sea lions have been largely ineffective and lacking uniformity depending on the stock's location.
>
> In the North Pacific, the management must recognize that uncertainty is high and that the regulation of human activities requires a highly precautionary approach that seeks to avoid deleterious changes in the Bering Sea, Aleutian Islands and Gulf of Alaska ecosystems rather than to mitigate damages after the fact. The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) decision rule for krill reflects an alternative management approach that incorporates ecosystem concerns into fisheries management. The Council and NMFS need to employ a similar approach and adopt a fishery ecosystem plan as part of the FMPs.

The assessment team believes that, with respect to each fishery, the management system demonstrates a good and improving ability to present various types of ecological information, most notably reflected in the Ecosystem Considerations report annually prepared by NMFS for submission to the NPFMC. The scientists involved in this process are among the most skilled and respected in the world, and the quality of their work is very high by any relevant standard. This indicator would have received a higher score, were it not for the fact that, in the assessment team's judgment, the management process for each fishery is problematically slow to incorporate relatively well developed ecological information and, more important, has not demonstrated a robust commitment to assessing--in a scientifically creditable way--the ecological impacts of the fisheries. The reader is encouraged to review the extensive discussion of these concerns presented in the section of this report dedicated to assessment of the fishery relative to MSC Principle 2.

Condition

To improve deficiencies in performance for this Indicator, the fishery is required to:

1. Meet the requirements for conditions under Principle 2, Indicator 2.3.1 that requires the fishery to demonstrate its ability to perform ecosystem-based management by designing and performing scientifically creditable tests of the ecological impacts of the fishery on Steller sea lion foraging; and

2. Follow the requirements under Principle 2, Indicator 1.1 that call for incorporation of specific ecosystem management considerations and goals into the development of ABCs for the fishery for presentation to the SSC and to the North Pacific Council.

<u>Indicator</u> 1.3 The management system incorporates and applies an effective strategy to manage the socioeconomic impacts of the fishery *[Relates to MSC Criteria 3.2, 3.4, 3.6, 3.7*]

Elements considered in scoring include:

- Compatibility of economic incentives with exploited stock and ecosystem goals and objectives, including effects of subsidies
- Observation of long-term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability
- Application of precautionary approach

100 Scoring Guidepost

- The fishery is free from subsidies that directly and substantially promote overfishing or ecosystem degradation
- Participants in the fishery have access to short- and long-term economic incentives that, taken alone or in combination with other management measures, act to prevent overfishing and ecosystem degradation
- Economic rent from the pollock fishery is shared in a manner that recognizes those dependent of fishing for food and livelihood and does not promote overfishing or ecosystem degradation.
- New entrants are accommodated without unduly disrupting other participants or undermining fishery and ecosystem management goals.
- The fishery management system provides for long-term predictability or other risk management and hedging tools such that rational and prudent investments can be made that are consistent with ecological sustainability (i.e. no overfishing or ecosystem degradation).
- The fishery management system continually seeks to understand social and economic consequences of management decisions and seeks and accepts input from all stakeholders regarding management decisions.

80 Scoring Guidepost

- The fishery is free from subsidies that directly and substantially promote overfishing or ecosystem degradation
- Economic rent from the pollock fishery is shared by communities historically dependent on pollock and those dependent on other ecosystem resources affected by the pollock fishery, including subsistence fisheries, if any
- The fishery management system provides for long-term predictability or other risk management and hedging tools needed for rational and prudent investment

- The fishery management system seeks to understand social and economic consequences of decision-making

60 Scoring Guidepost

- The fishery management system creates economic incentives for overharvest or unproductive use of harvested species, or ecosystem degradation.
- The fishery management system does not recognize the rights of subsistence fishers or others dependent on fishing for a livelihood.
- The fishery management system does not seek stakeholder input regarding management decisions.
- The significant environmental and social externalities of the fishery are poorly understood or, if understood, generally not internalized by the fishery

SCORE 80

The Council has enacted plan amendments with significant economic implications to achieve fishery management goals. For example, Amendment 45 implemented in 1996 divided pollock harvests into trimesters limiting the percentage of pollock TAC to be harvested when roe is available in an early calendar year fishery. In 1999 seasonal allocations were changed to quarterly limits and under the Steller sea lion measures 50 percent is allowed to be harvested during the roe (A and B) season. These measures achieved a management goal of temporal dispersion of the pollock harvest even though pollock harvested during the roe season is much more valuable than pollock harvested during the non-roe season. Also, the Council imposed an increased retention/increased utilization requirement via Amendment 49 to reduce discards and to enhance the value derived from pollock harvests.

The most sweeping management changes attuned to social and economic rent sharing were the inshore/offshore amendments to the GOA FMP. Amendment 23, implemented in 1992, allocated 100% of the directed pollock fishery in the GOA to catcher vessels delivering inshore. This precluded C/Ps from usurping resource rents and provided stability for the inshore harvesting and processing sectors and local fishing communities. The GOA harvester vessels tend to be smaller than C/Ps and BS/AI based catcher vessels, use less horsepower and smaller nets, and are more tied to fishery dependant communities. These allocations were continued by Amendment 40 in 1995, Amendment 51 in 1998, and Amendment 61 in 1999.

Management measures have been crafted over time to bring some stability to the GOA fisheries while at the same time allowing new entry. In 1995 Amendment 28 to the GOA FMP enacted a moratorium restricting further entry of vessels to the GOA groundfish fishery. This measure was instituted to prevent a worsening of the “race for fish”. Amendment 41 (passed in 1995 and effective in 2000) implemented a license limitation program in the GOA groundfish fisheries. The limitations were modified by Amendments 57 and 58 after continued public discussions. Moratorium permits and licenses are freely transferable with certain vessel and area restrictions.

The applicant noted that, by using a precautionary approach and setting conservative harvest levels (as described in the applicant's responses to Indicators 1.1 and 1.2), the management system provides for sustainable jobs in the pollock fishery. The management system considers economic factors in determining the optimum yield for a fishery, but the Magnuson-Stevens Act defines optimum yield as the maximum sustainable yield "as reduced by any relevant economic, social or ecological factor."[51]

Appendix C to the annual SAFE report contains an economic assessment of the fishery, the products produced and the markets served. Socioeconomic issues are also considered as part of each management measure adopted by the North Pacific Council and are evaluated pursuant to the requirements of NEPA. Each amendment considered incorporates social and economic analysis of alternatives.

The evaluation team believes that, overall, the fishery management system performs extremely well in considering and being responsive to socioeconomic considerations. The fishery management system is free of explicit economic subsidies that would create incentives for overharvest, and includes many features that promote efficiency and accountability. The evaluation team applauds the considerable effort made over many years to rationalize the economics of the fishery through adoption of quota systems and cooperatives. The evaluation team was concerned, however, by what appears to be inadequate consideration of and responsiveness to the impacts of the fisheries on the social and economic interests of certain Native Alaskan communities that are dependent on sea lions, and, to a lesser extent, salmon and halibut that are taken or potentially impacted by the fisheries. The evaluation team was also concerned that consideration of socioeconomic factors apparently propelled enactment of major management measures, most notably the various components of the AFA, without consideration of the potential ecological impacts.

Subcriterion 1.4 There is a well defined strategy for research related to the objectives of the fishery

<u>Indicator</u> 1.4.1 There is a research strategy to support the harvest strategy and to address information needed to support the identification and mitigation of ecosystem impacts *[Relates to MSC Criterion 3. 8]*

Elements considered include:

- Role of science in setting research agenda
- Diversity and quality of input
- Transparency of process
- Relationship between those who design research and those responsible for implementation
- Relationship to present and future management needs

[51] § 3(28), Magnuson-Stevens Act.

100 Scoring Guidepost

- Stable, well-led, diverse and objective research planning organization
- Ample and secure funding to support near and long-term research needs
- Significant and regular agreement between fishery managers and research scientists on research needs and priorities in the fishery
- Continuing, significant progress in scientific understanding of target and impacted species
- Continuing, significant progress in application of scientific understanding to harvest strategy
- Continuing, significant progress in scientific understanding of ecosystem impacts of fishery
- Continuing, significant progress in application of scientific understanding to ecosystem management strategy
- Continuing, significant progress in understanding of social and economic considerations related to the fishery
- Continuing, significant progress in application of social and economic understanding to management of the fishery

80 Scoring Guidepost

- Stable, well-led, diverse and objective research planning organization
- Funding to support near-term research needs
- Regular agreement between fishery managers and research scientists on near term research needs and priorities in the fishery
- Evident progress in scientific understanding related to target and impacted species
- Evident application of scientific understanding to harvest strategy
- Evident progress in scientific understanding related to ecosystem impacts of fishery
- Evident application of scientific understanding to strategy for managing ecological impacts of fishing
- Evident progress in understanding of social and economic considerations related to the fishery
- Evident application of social and economic understanding to management of the fishery

60 Scoring Guidepost

- Research is carried out in sporadic projects with little strategic planning or coordination
- Fishery managers fail to support research with the potential to reduce or otherwise constrain harvest levels
- Fishery mangers fail to apply research results in a rational or objective manner
- Fishery managers on average do not heed the advice of research scientists in the fishery

SCORE 80

The evaluation team was provided with a considerable body of information by the applicant and others concerning the research programs applicable to the GOA pollock fishery. The nature of that research is discussed at length in the parts of this report covering MSC Principle 1 and Principle 2. This discussion summarizes the overall research program.

NMFS' Alaska Fisheries Science Center (AFSC) is the principal research agency responsible for fish stock assessments, monitoring and assessing marine mammal populations and studying the effects of the groundfish fisheries on the environment.[52]

AFSC's Resource Ecology and Fisheries Management division (REFM) conducts research and data collection to support management of the fishery. AFSC's Resource Assessment & Conservation Engineering (RACE) division conducts and reports results of surveys designed to establish time series estimates of distribution and abundance of groundfish resources, including the pollock resource. And the National Marine Mammal Lab conducts research across the board on issues relating to marine mammals.

Scientists from the AFSC and scientists from other federal and state agencies and universities comprise the Groundfish Plan Team that also sets forth research goals in the annual SAFE document. The SAFE document typically provides a detailed discussion of the survey research plan and research results and a chapter dedicated to a review of the effects of fishing from an ecosystem perspective, and the effects of environmental change on fish stocks.

The research plans and activities, which are documented on the AFSC website, are peer reviewed by the North Pacific Council's Scientific and Statistical Committee. The SSC research priorities are spelled out in the minutes of the SSC's meetings. The AFSC website contains a list of scientific publications issued annually by scientists affiliated with the AFSC. In 2001, NMFS' AFSC scientists authored or co-authored 67 scientific papers on North Pacific marine research topics. A list of all AFSC published papers is available on the website reaching back to 1990. Many of these documents can be downloaded by the public. The AFSC website includes links to many other types of materials published by the AFSC on a range of important topics.

Public notice is required in announcing Plan Team meeting as well as SSC meetings. The meetings are open to the public, stakeholders are afforded an opportunity to question scientists about research activities and there are opportunities for public comment.

Congress has earmarked significant funds for marine research in the North Pacific in recent years, including appropriating more than $40 million in annual appropriations for FY 2001 and FY 2002 for issues related to Steller sea lions.

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[52] See, generally, http://www.fakr.noaa.gov/research.htm

NMFS is structured in such manner that the agency's research centers now report to the relevant personnel in NMFS headquarters. The centers also work with the regional offices to ensure that research addresses current and future management needs.

The AFSC's REFM division issues experimental fishing permits to fishermen or fishing groups proposing innovations to reduce bycatch and to achieve other conservation benefits.

Congress created the North Pacific Research Board to coordinate federal, state and university marine research projects to avoid duplicative research efforts and to facilitate dissemination of scientific findings. The Alaska Region director and the North Pacific Council chairman are voting members of the North Pacific Research Board.

The annual SAFE report has a section that pertains specifically to socioeconomic issues. Appendix C to the SAFE document is entitled, "Economic Status of the Groundfish Fisheries off Alaska."[53] Among other topics, the report provides estimates of total groundfish catch, groundfish discards and discard rates, ex-vessel value of the groundfish catch, gross product value and the number and sizes of vessels that participate in the Alaska groundfish fisheries. In addition, the report contains data on some external factors affecting the economic status of the fisheries, including foreign exchange rates, cold storage holdings and fishery imports. NMFS economist Joe Terry is one of the key authors of this section of the annual SAFE report. The North Pacific Council and the SSC have noted their need for better socio-economic data on, among other things, the effects of conservation and management measures on fishery dependent communities and on low income and minority populations. NMFS is also designing a data collection program to obtain cost and expenditure data to better understand the industry structure and the effects on fishermen and processors of proposed management measures.

In the view of the evaluation team, the pollock fisheries benefit from significant research support, and recent years have seen dramatic increases in federal funding available for research. This indicator would have received a higher score were it not for several points of concern to the evaluation team. Though research funding is high today, largely in response to the management crises linked to recent litigation, there is a not-inconsiderable chance that funding will decline in coming years, frustrating long-term efforts to improve the management system's understanding of, among other things, the ecological impacts of the fishery. The team was also concerned by the fact that the management system has not demonstrated a robust commitment to development or use of fundamental information concerning the fisheries' impacts on the ecosystem. Finally, the team observed some troubling evidence that the process by which research planning occurs, and the standards applied to grant credence to research results, are less than fully objective as a scientific matter, and somewhat unstable.

SCS Criterion 2

[53] http://www.fakr.noaa.gov/npfmc/safes/safe.htm

The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral, and explicit basis

<u>Indicator</u> 2.1 The fishery is managed and conducted in a manner that respects international conventions and agreements and not under any controversial unilateral exemption to an international agreement *[Relates to MSC Criterion 3.1]*

100 Scoring Guidepost

- The management system is in full compliance with all aspects of applicable international law, including but not limited to international law on specie and ecosystem protection, indigenous cultures, property, labor, law enforcement, communications, and jurisdictional boundaries.
- The management system does not employ or in any manner seek to operate within any exemption to otherwise applicable international law
- The management system regularly and consistently seeks and uses appropriately the advice of experts in international law, including independent experts.

80 Scoring Guidepost

- The management system is in full compliance with international fisheries and environmental law
- The management system does not operate under any controversial exemption to an international fisheries or environment-related agreement
- The management system has access to and makes use of experts in international law

60 Scoring Guidepost

- The management system can be shown to have a consistent pattern of failing to reliably monitor and act to assure its compliance with international fisheries and environmental law

SCORE 100

The applicant advised the evaluation team that the GOA pollock fishery is conducted within the U.S. 200-mile Exclusive Economic Zone (EEZ) and harvests only U.S.-origin species. The applicant supplied information, which supports the view that the pollock fishery is conducted in a manner consistent with international agreements such as provisions of the U.N. Convention on the Law of the Sea (UNCLOS).[54]

For example, Articles 6 and 7 of the global Code of Conduct call for long term measures based on the best available scientific evidence, prevention of overfishing, application of the precautionary approach, environmental impact assessment, protection of related species in the ecosystem, protection of biological diversity, consideration of artisinal and subsistence use, a

[54] APA at 12.

transparent and accessible system and information, data collection, promotion of scientific research, and enforcement.

Similarly, Article 7.6.9 of the global Code of Conduct for Responsible Fisheries calls for "appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species," and then proceeds to describe measures that are comparable to efforts in the pollock fisheries to reduce bycatch and discards and to avoid prey competition with Steller sea lions.[55]

In the view of the evaluation team, the evidence presented to the team suggests that the management system is in compliance with international law and is devoting adequate attention to assuring compliance in the future.

<u>Indicator</u> 2.2 The fishery is managed and conducted in a manner that respects domestic law *[Relates to MSC Criterion 3.16]*

Elements considered in scoring include:

- Consistency and quality of compliance with federal law (efforts to assure compliance, reasons for incidents of non-compliance, severity of consequences of non-compliance)
- Integration of compliance requirements among the multiple domestic legal regimes that apply to the fishery

100 Scoring Guidepost

- The management system is in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found at any time to be in willful violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the pollock fishery
- No officer or agent of the management system, including its component entities, has at any time been found to be in contempt of any domestic court of jurisdiction on any matter related to performance of official duties on behalf of the management system concerning the pollock fishery
- The management system regularly and consistently seeks and uses appropriately the advice of experts in domestic law, including independent experts

80 Scoring Guidepost

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[55] Many of the points of comparison between international law and the pollock management regime were highlighted in Bernstein, et al., at 28, 78.

- The management system makes consistent, good faith efforts to be in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found repeatedly by any domestic court of jurisdiction to be in violation of any significant aspect of any domestic law related to protection of the human or natural environment, individual species, ecosystems, or fishery dependent communities
- The management system has access to and makes use of experts in domestic law.

60 Scoring Guidepost

- The management system fails to reliably monitor and assure its compliance with all substantive and procedural aspects of applicable domestic law
- Harvest management decisions made by fishery managers are regularly overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law

SCORE 62

The history of federal court litigation surrounding the pollock fishery produced, among other things, a significant amount of ready advocacy from the applicant and others as to the fishery's level or adequacy of compliance with and respect for domestic United States law. [56]

The applicant believes that the management system for the GOA pollock fishery appears to meet the requirements for this indicator. The applicant makes the case that the management system …….. "makes consistent, good faith efforts to be in compliance with all substantive and procedural aspects of applicable domestic law [and] has not been found repeatedly by any

[56] It bears explaining that the assessment team's consideration of this indicator is particularly influenced by the team's threshold decision to consider the fishery management system to include, among other elements, the United States' federal courts, as well as the National Marine Fisheries Service. The team's analysis, thus, approached questions of "legal compliance" and "respect for law" from the perspective of the inter-related behavior of the various components of the system, especially the interaction of the courts and NMFS. Legal scholars, psychologists, and political scientists actively study how agency decision-making is affected by judicial review. The literature reveals strong disagreement on the question whether judicial review improves or impairs the quality of agency action, but there is no disagreement that agency rules, meaning in this case the way the pollock fishery is actually managed, ultimately manifest the energies and influences of the agency and the courts carrying into motion the statutory directives of the Congress. See, e.g., Mark Seidenfeld, *Symposium, Getting Beyond Cynicism: New Theories of the Regulatory State, Cognitive Loafing, Social Conformity, and Judicial Review of Agency Rulemaking*, 87 Cornell L. Rev. 486 (2002) (supporting the theory that judicial review reduces biases and institutional flaws in agency decisionmaking); Jerry L. Mashaw & David L. Harfst, THE STRUGGLE FOR AUTO SAFETY 151-52 (1990) (concluding that judicial review led the National Highway Traffic Safety Administration to abandon setting safety regulations in favor of recalls); R. Shep Melnick, *Administrative Law and Bureaucratic Reality*, 44 Admin. L. Rev. 245, 247 (1992) (arguing that the risk of reversal of rulemakings for reasons an agency cannot predict or control will deter rulemaking generally); Richard J. Pierce, Jr., *Two Problems in Administrative Law: Political Polarity on the District of Columbia Circuit and Judicial Deterrence of Agency Rulemaking*, 1988 Duke L.J. 300, 302-03 (1988); Thomas O. McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 Duke L.J. 1385, 1410-20 (1992) (offering specific examples of agencies stymied by judicial review); Richard J. Pierce, Jr., *The Unintended Effects of Judicial Review of Agency Rules: How Federal Courts Have Contributed to the Electricity Crisis of the 1990s*, 43 Admin. L. Rev. 7, 8 (1991) (blaming judicial review for "policy paralysis" in many agency rulemaking contexts); Frank B. Cross, *Pragmatic Pathologies of Judicial Review of Administrative Rulemaking*, 78 N.C. L. Rev. 1013, 1044-57 (2000); Frank Cross, *Shattering the Fragile Case for Judicial Review of Rulemaking*, 85 Va. L. Rev. 1243, 1313-14 (1999) (questioning the value of dialogue between agencies and the courts).

domestic court of jurisdiction to be in violation of any significant aspect of any domestic law…"[57].

The applicant pointed to the North Pacific Council and NMFS' efforts to comply with NEPA since the GOA groundfish FMP was first developed. The Council prepared environmental impact statements (EISs) for the groundfish fisheries in 1979 and 1981, respectively. The applicant provided a summary of the more than 60 amendments to the BSAI and GOA plans, which in their opinion reflected a commitment to adaptive, ecosystem-based management principles incorporated in the Magnuson-Stevens Act, Endangered Species Act, and other law.[58] As required by NEPA, the Council and NMFS prepared an environmental review for each plan amendment, as well as other regulatory actions, in conformance with requirements of domestic law. For example, in the early 1990s, NMFS prepared a comprehensive EIS on the "inshore/offshore" amendments to the FMPs. More recently, revised SSL protection measures were subject to a comprehensive SEIS, released in November 2001.

The applicant noted that the U.S. District Court for the Western District of Washington had recognized the agency's long-term conformance with NEPA in its July 13, 1999 Opinion. While the Court held that NMFS' 1998 SEIS was inadequate, the opinion noted, "Each amendment to the FMPs may have been individually minor and therefore properly dealt with in an EA/FONSI rather than in an SEIS. *See* Greenpeace Action v. Franklin, 14 F.3d 1324, 1332 (9th Cir.1992) (1991 amendments too minor to warrant an EIS)."

The applicant noted that one obvious indication of the management system's respect for domestic law is that the groundfish fisheries operate pursuant to federal regulations implementing the groundfish FMPs, as amended, and there is no court challenge pending under NEPA to bar these fisheries from being conducted.

The applicant addressed the 1999 ruling by the federal court that NMFS was not in compliance with NEPA as to analysis of the groundfish fisheries. The court ordered preparation of a PSEIS that would comprehensively evaluate the cumulative effects of the FMPs on the environment and to file with the court written reports regarding the progress of its NEPA process every 60 days, starting from the date of the Order.

As summarized by the applicant, NMFS has made good faith efforts to comply with the court's order, including taking the following steps:

- In October 1999, NMFS reported to the court that the agency had created a new full-time position of NEPA coordinator for developing the PSEIS.

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[57] Memorandum from At-Sea Processors Association to Pollock Assessment Team Regarding Issues Related to Principle #3; Indicator 2.2 (June 8, 2002).

[58] NPFMC, Amendments to the Fishery Management Plan for Groundfish in the Bering Sea and Aleutian Islands (1999), submitted as Appendix 3 to APA's Response to Performance Indicators for MSC Principle Three.

- NMFS announced public scoping sessions in Juneau, Anchorage, Kodiak and Seattle for November 1999 to receive input on development of a draft SEIS and extended the public comment period by 30 days.
- NMFS met with plaintiffs' attorneys to discuss the PSEIS and the timeframe for completing the document.
- In January 2000, NMFS held a three-day workshop attended by 25 NMFS scientists and managers to discuss the analytical framework for the PSEIS.
- NMFS reported to the court in March 2000 that the agency had completed its report on the scoping process, including summarizing public comment, responding to public comment and describing the alternatives for analysis.
- NMFS requested public comment on the scoping report.
- In August 2000, the agency informed the court that 75 NMFS scientists and managers, joined by an additional 25 consulting scientists, were preparing the draft PSEIS.
- In January 2001, a 3,300 page draft PSEIS was published. The draft included an Executive Summary and eight volumes of analysis. NMFS announced that four public hearings would be scheduled as well as two teleconferences to provide additional opportunities for public comment.
- NMFS contracted with two independent, nationally-recognized NEPA experts, Dr. Larry Canter of the University of Oklahoma and Dr. Samuel Atkinson of the University of North Texas to evaluate the draft and consult with the agency on how best to consider and, respond to, public comment.
- At the "behest of the public," NMFS extended the public comment period on the draft PSEIS to 180 days. The agency reported receiving 21,361 public comments, including 4,044 "substantive comments." This information was presented to the court in NMFS' October 3, 2001 status report.
- In response to public comment, the agency decided to revise the draft PSEIS to include "additional analyses concerning environmental, economic and cumulative impacts." NMFS also decided to restructure its alternatives "shifting from single-focus alternatives to more comprehensive, multiple-component alternatives." NMFS also announced that it would release another draft PSEIS for public review before issuing the final PSEIS.
- NMFS' SEIS Team held work sessions with stakeholders in Anchorage, Juneau, and Bethel, Alaska and in Seattle between February and April 2002, consulted with the North Pacific Council and met with environmental groups and industry groups to discuss the structure of alternatives.
- The second draft PSEIS will be issued in the fall 2002 [Note to the reader: this date has slipped since the team received the submission from the applicant], and a final PSEIS is scheduled to be completed by September 2003 with a Record of Decision on the PSEIS planned by December 31, 2003.

In the words of the applicant:

Over the years, NMFS and the Council have shown good faith in handling their respective responsibilities under NEPA as well as other applicable law, including the Magnuson-Stevens Act, the Endangered Species Act, and the Marine Mammal Protection Act. As a result, fish stocks are healthy and the fisheries sustainable. In one instance, a U.S. District Court has ruled that the scope of NMFS' 1998 SEIS was too narrow in scope and ordered the agency to undertake a comprehensive, programmatic SEIS. The agency is dedicating substantial human and financial resources to comply fully with the Court's Order. With respect to NEPA compliance, and other applicable laws, the management system meets at least the 80 Scoring Guidelines for Indicator 2.2.[59]

Conservation stakeholders believe that NMFS is not respecting domestic federal law in managing and conducting the Alaska pollock fisheries (Marz and Stump, 2002). In their view, NMFS has engaged in a pattern of management actions and inaction regarding the groundfish fisheries that violate NEPA and the ESA. NMFS has failed to have a programmatic supplemental environmental impact statement under NEPA that covers the activities, including the pollock fisheries, that occur pursuant to the fishery management plans for the BSAI and GOA and has yet to complete an EIS analyzing the impacts of the fisheries on essential fish habitat. Though matters have changed since the time of their submission to the team, the conservation stakeholders then noted also that NMFS' most recent Biological Opinions were again being challenged in court.

The evaluation team, mindful of the significance of this indicator, solicited and received specific advice from legal counsel for APA, NOAA, and conservation stakeholders. Their advice led us to conclude that the management system generally respects domestic law -- and that is what this indicator sets as a minimum threshold in order that the fishery be eligible for certification. This indicator does not require that the fishery management system be in perfect minute-to-minute compliance with every single piece of substantive and procedural law that governs the pollock fishery. It would elevate form over substance to set the bar that high and we did not do so. But compliance with the law is certainly the most revealing evidence of respect for the law, and the evidence here is very problematic.

The management system's record of compliance with domestic law, as evaluated over at least the last decade, reveals a number of instances where federal fishery managers have taken actions relevant to the pollock fishery that were challenged and overturned in court. When a federal court concludes that an agency action does not fulfill the requirements of a law, the agency is by definition "not in compliance" with applicable law.

For example, the U.S. District Court for the Western District of Washington has ruled that NMFS is not in compliance with NEPA with respect to North Pacific groundfish management. The U.S. District Court for the District of Columbia has ruled that the NMFS is not in compliance with NEPA with respect to promulgation of rules for designation of essential fish habitat as required by the Magnuson-Stevens Act. The U.S. District Court for the Western District of Washington has repeatedly found important infirmities in NMFS' compliance with the Endangered Species Act in connection with North Pacific groundfish fisheries' impact on Steller sea lions.

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[59] APA Memorandum of June 8, 2002 at 8.

Disagreements among stakeholders about how the fishery ought to be managed, or disagreements between stakeholders and regulators, no matter how intense, do not of themselves demonstrate that the management system is failing to respect domestic law. Indeed, it may easily reveal that the system is working exactly as the law intends. Complex laws and complex facts, such as those associated with the pollock fisheries, can make compliance difficult despite good faith efforts to meet legal requirements. That said, a pattern of instances where agency decisions are overturned in court on the same or similar grounds does give rise to the inference that the agency has failed to give the law the respect it is due. And the basis on which an agency is found out-of-compliance can, and did in this case, reveal factors that were relevant to scoring of this indicator.

The evaluation team has a concern that is directly related to NMFS' approach to the most recent biological opinion on Steller sea lions (the "2001 BiOp"). The team reviewed the 2001 BiOp, the BiOp that preceded it (the "FMP BiOp"), and related technical reports and we were not able to discern the scientifically determinative character of the new information--satellite tracking data on the movements of several sea lions over a limited period of time--cited by NMFS as the basis for authorizing significant changes in the location and timing of the pollock fisheries, particularly insofar as those changes resulted in increased fishing in areas designated as critical habitat for Stellar sea lions. [60]

The management system's receptivity to and use of the newly reported sea lion tracking data gave the evaluation team the impression of having been based on a less rigorous standard of scientific proof and conservatism than the standard normally applied within this system to new research results or other information submitted in connection with management of the fishery.

The conservation stakeholders challenged the 2001 BiOp in federal court citing, among other alleged shortcomings, the same concern noted by the evaluation team. The federal court upheld the conservationists' challenge on that very ground, finding that NMFS had not performed "the necessary analysis of the impact of the [new biological opinion's recommended harvest criteria] on Steller sea lions, their prey, and their critical habitat." The court ordered NMFS to prepare the analysis missing from the 2001 BiOp.

It is among the most worrisome signs of failure to respect domestic law that an agency would not properly analyze or explain the basis for a major decision on a controversial matter that the agency had litigated and lost before (i.e., sea lion conservation). NMFS itself has testified before the U.S. Congress that the agency is well aware that it has a chronic problem successfully meeting the terms of NEPA and the ESA and that the courts were taking a dim view of the agency's administration of the law (Hogarth, 2002; Dalton, 2002). A former NMFS director testified before Congress that:

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[60] The management system's receptivity to and use of the newly reported sea lion tracking data gave the evaluation team the impression of having been based on a less rigorous standard of scientific proof and conservatism than the standard normally applied within this system to new research results or other information submitted in connection with management of the fishery. The assessment team heard from many individuals both inside government and out that the data was applied in an expedient way through a less-than-open process tailored to prevent the economic harm feared from certain proposed area closures. Others we interviewed defended the process and the use of the data. On balance, the team felt the critics had the more convincing perspective. See the detailed discussion of the tracking data issue under Principle 2 , Indicator 1.2.1

Beginning in 1996, legal challenges have risen from an average of 1 or 2 each year to a current high of 26 in 2001. While much of the rise has been blamed on enactment of the Sustainable Fisheries Act, a larger proportion of the new cases have been challenges under the National Environmental Policy Act, the Endangered Species Act and the Regulatory Flexibility Act….

More troubling than the cases themselves has been the decline in the ability of NMFS to prevail when agency decisions are challenged. Before 1994, the government lost very few cases. In recent years, however, this record has been reversed and in the last four years the agency has lost more cases than it has won. This gives rise to expectations of success by other potential litigants, and issues that might have been resolved by the give and take of the regulatory process are remanded for consideration by the courts (Dalton, 2002).

NMFS' problem stems from many sources, some of which are in the agency's power to change and some of which are not. The evaluation team's perspective on this indicator is heavily influenced by the equivocal impression given by NMFS officials interviewed by the evaluation team, concerning the agency's determination to take measures in-house to improve its ability to meet the terms of those laws. In brief, some officials clearly believe that the agency's compliance problem results from bad laws, hostile stakeholders and litigants, unreasonable judges, or all of them together. Other officials assign fault to the agency's complex internal structure, diverse and evolving mission, and limited resources.

The evaluation team is aware that NMFS, with assistance from NPFMC and others, is taking steps to bring the management of the fishery into compliance with NEPA, ESA, and the Magnuson-Stevens Act. Importantly, NMFS, APA, and the conservation stakeholders recently agreed to settle pending litigation on terms that have been adopted by the federal court and entered as an order to the parties, effective April 1, 2003. The order covers all of the significant NEPA and ESA compliance matters that have been the subject of recent disputes among the parties. The settlement among the parties requires NMFS to bring the management of the North Pacific groundfish fisheries into full compliance with NEPA and the ESA (as to the issues under litigation) within certain timeframes set for this year and in 2004. It appears that the agency is on schedule to complete the analyses required under the settlement, although the PSEIS received voluminous adverse comment from some stakeholders.

The evaluation team notes that the PSEIS in preparation for the groundfish management plan is quite impressive in its scope and depth and analytical sophistication. Indeed, the team has relied extensively on the first draft of that document in performing our evaluation of the fishery. The PSEIS, when finished as ordered by the court, may come to serve as an analytical resource that will support better-informed and even more successful management of the pollock fisheries. The PSEIS may come to represent a transformational force in the history of the pollock management system, a tool that allows the Council and NMFS to integrate ecosystem, listed species, habitat and other considerations fully into the fishery management planning process. It has that potential.

But the agency has not yet completed the work ordered by the court and a great deal of difficult work and decision-making remain to be done. NEPA does not require decision makers to make good decisions about implementing the Magnuson-Stevens Act or ESA; it simply requires that they have the information to do so if they choose to. The pattern of past compliance difficulties raises the question whether the management system will indeed perform its obligations in a manner that shows the measure of respect for domestic law contemplated by this indicator.

Condition

To improve the deficiencies in performance for this indicator, the fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy. The fishery must, in particular, meet the terms of the Order dated April 1, 2003, which sets specific deadlines in 2003 and 2004 for completion of ESA- and NEPA-related analyses and procedures. That Order requires NMFS to revise its 2001 Steller sea lion biological opinion not later than June 30, 2003 and to issue the final PSEIS (and a decision based on the analysis) not later than September 1, 2004. The revised Steller sea lion biological opinion was signed on June 19, 2003.[61] As of May 2004, NMFS reports that it expects to release the final PSEIS in June 2004, and will issue a final Record of Decision based on the EIS not later than September 1, 2004.[62]

The evaluation team advises that it will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species unless the impacts of those activities on listed species are analyzed and documented in a manner consistent with the high standards of scientific technique and public involvement of which the fishery management system is capable. The scoring of this indicator will be revisited, and likely revised downward, if a court finds that the fishery is being managed in a manner that fails to comply with any significant provision of applicable law, whether or not the issue in question has been the subject of prior disputes.

Indicator 2.3 The fishery is managed or conducted in a manner that observes legal and customary rights *[Relates to MSC Criterion 3.4]*

Elements considered in scoring:

- Recognition of and respect for applicable private property rights
- Recognition of and respect for applicable subsistence or customary rights

100 Scoring Guidepost

[61] http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/703remand.pdf
[62] http://www.fakr.noaa.gov/sustainablefisheries/seis/news13.pdf

- The fishery management system recognizes and makes affirmative efforts to enhance the security and value of property rights in the fishery
- The fishery management system recognizes and makes affirmative efforts to enhance the security and value of subsistence and customary rights in the fishery
- The fishery management system provides a fair, efficient, predictable means to avoid and reconcile conflicts between legal and customary rights.

80 Scoring Guidepost

- The fishery management system recognizes property rights in the fishery
- The fishery management system recognizes subsistence and customary rights in the fishery
- The fishery management system provides a fair means to avoid and reconcile conflicts between legal and customary rights.

60 Scoring Guidepost

- The fishery management system is largely indifferent to, or makes inadequate efforts to understand and recognize property, subsistence, and customary rights, if any, in the fishery.

SCORE 90

Pollock are pelagic species of relatively low caloric value (compared to salmon and herring). There is no evidence of aboriginal take of pollock except as occasional bycatch in jig fisheries. Likewise, pollock has never been a subsistence fishery in historic times.

Property rights in the fishery in the form of moratorium permits and limited license endorsements were established in the late 1990s as described in Indicator 1.3.

In the view of the evaluation team, the GOA pollock fisheries generally do a very good job of observing customary and legal rights to the fishery.

SCS Criterion 3

The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic, and institutional information.

<u>Indicator</u> 3.1 The management system solicits and takes account of relevant information *[Relates to MSC Criterion 3.2]*

Elements considered in scoring include:

- Solicitation and treatment of scientific information from NMFS, NPFMC and other sources
- Solicitation and treatment of information from stakeholders
- Accommodation of dissent and respect for differing perspectives
- Training at all appropriate levels with respect to management principles and criteria

100 Scoring Guidepost

- The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information
- The management system seeks affirmatively to acquire information that may be controversial or reveal weaknesses in the management system, including matters related to compliance with applicable international and domestic law
- The management system evaluates information in an unbiased, objective manner and does not discriminate against information solely upon the basis of the identity of stakeholder category from which it was supplied

80 Scoring Guidepost

- The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information
- The management system accepts information that may be controversial or reveal weaknesses in the management system
- The management system shows evidence of listening and responding to diverse points of view

60 Scoring Guidepost

- The management system presents significant overt or implicit resistance to introduction or consideration of new information that is potentially relevant to the management of the fishery

SCORE 78

The applicant advised the evaluation team that, overall, the U.S. fisheries management system is open, transparent and is structured to encourage participation by all interested and affected parties.[63] In their view, management of the North Pacific groundfish fisheries recognizes the importance of considering a range of views and takes all appropriate steps to foster discourse among scientists, managers and stakeholders.

The applicant noted that all relevant regional offices and divisions of NMFS' Alaska Fisheries Science Center (AFSC) work with state fisheries management agencies, university scientists and stakeholders in presenting scientific information for peer review and public comment.

[63] APA at 16-18.

The Plan Team process which reviews information relating to survey research, fishery dependent research and stock modeling is an open, public process.[64] The Plan Team, which includes scientists from a wide range of disciplines, includes NMFS scientists, Council staff, and state and university scientists. The public is advised of Plan Team meetings and public comment is encouraged at these meetings.

The Council's SSC, which also includes individuals who represent a broad range of scientific expertise, is comprised of state, federal and university scientists.[65] The SSC comments to the North Pacific Council on all scientific matters on the Council's agenda. The SSC meetings are open to the public and public testimony is heard on all action items.

To promote broad stakeholder involvement and facilitate constituent access, the Council meets at various locations in Alaska (including Anchorage, Kodiak, Dutch Harbor and Sitka) as well as in Portland and Seattle. Section 302(i) (2) (C) of the Magnuson-Stevens Act requires regional management councils to provide timely public notice of upcoming meetings, including providing a published agenda for the meeting.[66] The North Pacific Council considers public comment on all action items, including the development of management alternatives. Section 302(e)(5) of the Magnuson-Stevens Act states that if any voting member of the Council requests a roll call vote on any matter before the Council, then a roll call vote shall be held. Section 302(e) (4) of the Act permits any voting Council member who disagrees with a Council position to submit a statement to the Secretary setting forth the reasons for such disagreement.

With respect to training, NMFS conducts workshops for all new North Pacific Council members to ensure full understanding of Magnuson-Stevens Act requirements as well as the Administrative Procedure Act and other relevant federal laws and regulations. Recently, the agency sponsored a NEPA training session attended by stakeholders, Council members, AP members and others.

It is the industry's view that NMFS and the North Pacific Council, including its advisory bodies, treat all stakeholders fairly and equitably.

The conservation stakeholders (Marz and Stump, 2002) contend that the North Pacific Council and NMFS solicit information from the public, but appear not to consider meaningfully information that is unfavorable to the fishing industry or the Council's reputation as "best managers." In the conservation stakeholders' terms: "The Council and NMFS have operated under crisis management, making changes in response to litigation, rather than to consider seriously comments made by conservation stakeholders and avoid litigation."

[64] http://www.fakr.noaa.gov/npfmc/Plan%20Teams/Groundfish/Planteam.htm

[65] http://www.fakr.noaa.gov/npfmc/SSCLIST.HTM

[66] http://www.fakr.noaa.gov/npfmc/Schedule.htm

The groups point to the manner in which the management system responded to information regarding the impacts of concentrated catch in Steller sea lion critical habitat, recommendations to set minimum stock size thresholds (MSSTs), differential gear impacts on Steller sea lions due to differing rates and volumes of biomass removal as well as on habitat, and establishment of EFH. In the view of the conservation stakeholders (Marz and Stump, 2002), "there are no procedures in the existing management processes to address the effects of fishing on protected species, habitat and their prey. This is a critical gap which must be formally addressed to ensure that deleterious impacts from fishing do not occur." The conservation stakeholders also note that the North Pacific Council and its Plan teams fail to incorporate information from the Ecosystem Considerations chapter of the SAFE report into stock assessments and management processes. The groups note, too, that there have been numerous peer reviews regarding the biological opinions and the RPAs drafted by NMFS to avoid jeopardy to Steller sea lions and, in their view, "it appears that the Council continues to seek out new peer reviews to support the Council's position."

In the view of the evaluation team, there is no doubt that the management system solicits, develops and considers very large amounts of ever-changing information with regard to the pollock fisheries. In many important respects, the fishery management process is well informed. As noted previously, the evaluation team was impressed by the scope and depth of analysis applied to stock assessment and certain socioeconomic matters. The PSEIS now under preparation may come to represent an exhaustive effort to acquire and evaluate an extremely broad collection of information relevant to improved management of the fishery. The NPFMC's decision to engage a panel of experts to evaluate the tier system is an important, positive factor in the scoring of this indicator.

However, the indicator score is reflective of the fact that, in reviewing the decision-making practices of the management system, the evaluation team discerned recurrent instances of resistance at all levels of the management system to information, advice, and opinions provided from outside the scientific and management community, especially if these embraced constraints on harvest levels. It would not serve a constructive purpose to delve into specific examples, but it should be noted that in many interviews we conducted, NMFS officials expressed palpable disdain for the views of stakeholders. We might not have viewed this attitude as a concern were it not for the fact that the same officials had turned aside advice or information from the same stakeholders that was subsequently vindicated (and imposed on the management system) by judicial opinion. The evaluation team is troubled by evidence of instances where the management system does not resolve matters of scientific uncertainty in favor of protected or endangered species, in contradiction to the purpose of the relevant legislation and a considerable body of directly relevant jurisprudence. The team was surprised and troubled to find through our interviews that many influential participants in the management system were fully aware that populations of certain animals potentially affected by the fishery are declining sharply, but expected that the management system would take no action to conserve the animals until their populations drop far enough to fall within the scope of the Endangered Species Act.

The infirmities of the NMFS-Council process observed by the assessment team may be problematic and troubling, but as a matter of perspective, it is important to bear in mind they are also characteristic of agency behavior and may be inherent but not beyond remedy in the dynamics of decision-making by any group of human beings. The leading legal scholar (Seidenfeld, 2002) has described the characteristic pathologies of decision-making by federal agencies:

Decision-makers have a tendency to confirm an initial hypothesis in the face of later-acquired disconfirming evidence, even though the hypothesis may not have been based on substantial or reliable evidence. This bias manifests itself in the decision-maker being prone to search for information that confirms the hypothesis, as well as to interpret information that he has as confirming the hypothesis….The confirmation bias can cause a decision-maker to be overconfident about his predictions.

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Scholarship on group decision-making indicates that groups virtually never approach the accuracy of the best choice of their individual members for each problem posed. One legal scholar's recent review of the literature comparing group and individual accuracy identifies several studies in which groups outperformed their single best member. Such performance, however, could result simply from the averaging function of group decision-making; it does not indicate that those groups have effectively pooled the knowledge and skills of their members. In addition, there is a rich literature demonstrating that small groups tend to pay less attention to information known only to a few members, and focus instead on information that is known to all members prior to group discussion.

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When decisions that a group is asked to make become not only non-verifiable by other group members, but predictive or normative in nature, group dynamics can actually reduce the quality of decision-making. One phenomenon of group decision-making is group polarization - the "process whereby group discussion tends to intensify group opinion, producing more extreme judgments among group members than existed before discussion." When the outcome of a decision can be placed on a normative scale, such as being risky rather than safe, liberal rather than conservative, or certain rather than uncertain, then the dynamics of group decision-making can actually increase the tendency of the group to choose an outcome that is on one end of the scale rather than in the middle.

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[W]hen group members share an individual bias, polarization can cause the group decision to magnify the impact of that bias. The egocentrism bias is one that frequently might be magnified by polarization. By way of illustration, suppose a group composed of professionals from a single discipline and office within an agency. Group members are likely to share a professional or office norm that may lead them all to advance one value over alternatives, and they are all unlikely to consider sufficiently how others who do not share that norm would assess the available choices. In that case, having these individuals make the choice as a group is likely to lead to polarization and hence to an outcome that is even farther from what others outside their profession or office might choose.

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Like individuals, groups also tend to search unduly for information and pay too much attention to arguments that confirm initial hypotheses. If most of the members of a group share an initial view of the best decision, the group will seek predominantly information that supports that view. This is true even for groups of experts. Moreover, it is not simply a result of aggregating individual biases; the members' interaction increases the propensity of the group to prefer information supporting initially preferred decisions over and above the level that would occur if one simply pooled the individual requests for information. The phenomenon of biased information search decreases as the heterogeneity of members' opinions regarding the initial hypothesis increases…. Initial heterogeneity, however, did not curb the bias if the group had discussed the problem and reached some consensus on a preferred solution prior to seeking additional information.

Even when some group members may be aware of information that undermines a group's initially preferred decision, the group may fail to consider the information to the same extent as it would consider confirming information. In other words, whether information is consistent with a group's preferred alternative affects the propensity of the group to discuss the information as well as its search for additional information. At the individual level, information consistent with the consensus group preference tends to be more salient and hence more easily recalled. In addition, there is often a group norm which expects group members actively to advocate their preferred outcome during debate. At the same time, groups try to simplify their decision-making tasks much as individuals do. Therefore, they try to narrow consideration early in the discussion to a few viable alternatives. As a result, groups tend to discuss information consistent with the position preferred by a majority of members, and to ignore information supportive of positions preferred by a minority of members. Even if a group has no initial majority position, a significant plurality preference can bias information discussion in favor of that preferred outcome and can repress discussion of minority positions. When only a plurality of the group favors a particular outcome, however, debate of alternatives preferred by minorities is not shut down, but tends to be limited to only one minority-preferred outcome. In sum, group dynamics tend to focus both search and discussion toward information that supports the initially preferred outcome of a majority of group members. This phenomenon creates a group analog to the individual decision-maker confirmation bias to which agency staff groups could be subject.

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In addition to interactions that might increase individual decision-making biases, group decision-making exhibits its own set of pathologies that could affect agency rulemaking. As already mentioned, groups tend to be imperfect at pooling the totality of information available to their members. A key to understanding group consideration of information is the concept of "shared information." Information is "shared" when it is known to all members of the group prior to deliberation; it is "unshared" when it is known to only one member prior to deliberation. One of the major impediments to optimal decision-making by groups is their tendency to focus on shared rather than unshared information. This is a particular concern when unshared or partially shared information not only counsels a different choice than that supported by shared information, but actually reveals that the choice favored by the unshared information is the superior one.

In many instances the problem is not merely that the group chooses to underutilize unshared information which is raised in discussion, but rather that the member who is privy to unshared information simply fails to mention the information in group discussion. This may be a statistical artifact of the group process - because unshared or partially shared information by definition is known to fewer group members, the chance of some member raising it is less than the chance that some member will raise information known to everyone. But there appear to be mechanisms other than mere statistical probability at work in suppressing unshared information. Even after a group member introduces unshared information into the group discussion, groups spend less time considering that information than they do shared information, and unshared information influences their decisions less than shared information does. In addition, the likelihood of a group hearing unshared information and relying on it depends on the status of the member who has the information. If the member is perceived by the group to be particularly competent at the task that the group is discussing, she is more likely to speak and to use unshared information to persuade the group to follow her preferred choice. Group leaders would thus be more apt to mention and prompt the group to rely on unshared information than would low-status members Seidenfeld, 2002).

The assessment team directly observed each of these phenomena at some point in our review of the NMFS-Council process, and we present them here at length in the hope that participants in the management system might also recognize them. Again, it would serve no constructive purpose to give specifics regarding the individuals and entities at issue here. Every part of the NMFS -Council structure gave the assessment team the impression of being heavily burdened by at least some of these types of problems. There are inherent frailties in the way scientific committees, regional councils, and federal agencies behave because, simply, humans are involved. But the severity and influence of the frailties can be mitigated if the various entities take stock periodically of their performance, call on objective observers for criticism and advice, and make good faith efforts to improve those things that are within the capacity of humans to modify.

Condition

To improve the deficiencies in performance for this indicator, the fishery must take affirmative steps to ensure that information and opinions submitted by stakeholders who do not represent the interests of the commercial fishing industry are given fair, professional, and transparent evaluation at all levels of the management system. The assessment team requires that the management system, ideally NMFS or the Council, commission, publish, and openly review an independent evaluation of the manner in which non-industry stakeholder information and opinions have been addressed in a representative set of circumstances identified by stakeholder interests. The evaluation should identify opportunities for procedural and substantive improvements, including measures to provide greater transparency and accountability to the process. The assessment team believes that the North Pacific Council and NMFS both would benefit from a candid evaluation of the quality and character of the procedures and practices by which the various layers of the management system invite and accommodate information that challenges the status quo. The management system should consider this type of inquiry to be fundamental to achieving continual improvement in the quality of its management practices and, thus, its service to the public. Though not a requirement, the assessment team recommends that the independent review consider the recommendations for improvement in Council processes proposed by the Heinz Center in 2002, the Pew Oceans Commission in 2003, and the U.S. Commission on Ocean Policy in 2004.

The evaluation required by this condition must be performed and published not later than 18 months following finalization of this assessment report. The North Pacific Council must consider and discuss in a regularly-scheduled public meeting the evaluation report, including all recommendations, not later than 6 months following publication of the report. The Council's actions, if any, in response to the report will weigh heavily in future reviews of the fishery management system and may significantly affect the score for this indicator.

Indicator 3.2 The management system involves all categories of stakeholders appropriately on a regular, integral, explicit basis *[Relates to MSC Criterion 3.2]*

Elements considered in scoring:

- Composition of decision-making and advisory bodies and terms of service
- Process for appointment to standing or ad hoc bodies, criteria for selection and rejection
- Quality of advance notice of meetings, availability of information, and other elements of management process

100 Scoring Guidepost

- The management system provides for direct representation of all significant public and private stakeholder interests
- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system produces decisions that take fully into account and address all significant stakeholder interests
- The management system operates pursuant to stable, predictable, objective procedures

80 Scoring Guidepost

- The management system provides for involvement by all significant public and private stakeholders and consideration of their interests
- The management system operates pursuant to stable, predictable, objective procedures

- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests

60 Scoring Guidepost

- The management system regularly omits involvement by one or more significant stakeholder interest
- The management system fails to follow its own official or formal procedures or routinely observes "unofficial" or "informal" decision making procedures that deviate significantly from formal or official procedures

SCORE 80

The North Pacific Council's website provides a menu item for "Council Family" that provides details on the Council's composition as well as that of advisory bodies to the Council.[67] There are 11 voting Council members and they represent diverse interests. There is a federal fishery official, state fisheries officials from Alaska, Washington and Oregon and seven private citizens nominated by state Governors and appointed by the Secretary of Commerce.

The private citizens serving on the Council at the time of the team's review included an academic, an Alaska native, a representative of the fish processing sector, the president of a catcher/processor company, a small boat fisherman who is active in an Alaska environmental organization and an avid sport fisherman. Council members serve three-year terms with a maximum limit of three terms. The composition of the Council reflects broader stakeholder involvement than that strictly required by law. Section 302 (b)(2)(a) of the Magnuson-Stevens Act requires only that voting members be knowledgeable about conservation and management, or the commercial and recreational harvest, of fishery resources and that the Council membership reflect a "fair and balanced" apportionment of active participants in the fisheries.

There is a 21-member Advisory Panel (AP)[68] that meets just prior to each Council meeting, takes public testimony and makes recommendations on any or all issues before the Council. AP members serve one-year terms. The membership at the time of the team's review included representatives of commercial fishing and processing sectors, subsistence fishing, consumers, federal fishery observers, environmental groups and sport fishermen.

A 12-member Scientific and Statistical Committee (SSC) also meets in conjunction with the Council. University scientists as well as scientists from federal, state and international fishery management agencies serve on the SSC.

The Groundfish Plan Team prepares an annual Stock Assessment and Fishery Evaluation (SAFE) report for the groundfish fisheries.

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[67] http://www.fakr.noaa.gov/npfmc/

[68] http://www.fakr.noaa.gov/npfmc/aplist.htm

In addition to these standing committees, the Council chairman from time to time appoints members of the public and members of the council family to participate on ad hoc committees to address specific issues, including ecosystem-based management, bycatch management measures, observer program evaluation, improved retention/improved utilization (IR/IU), etc.

The Council website and newsletter list meeting dates through 2005 as well as a detailed three-meeting outlook.[69] The Council publishes in advance of meetings a detailed agenda for the meeting. Analyses prepared by NMFS and the Council relating to agenda items are available by mail, electronically and by hard copy at the Council meetings. All meetings are open to the public (except for executive sessions dealing with personnel matters, items involving national security and/or litigation) and public testimony is taken on any action item on the Council's agenda.

Conservation stakeholders argue (Marz and Stump, 2002) that the Council fails to meaningfully involve all categories of stakeholders in the issues it considers. They point to the composition of the Council, noting that it does not include a seat expressly for non-consumptive users of marine resources and is dominated by fishing industry representatives. In addition, the conservation groups argue, Council committees are not balanced to include appropriate representation from non-consumptive marine resource interests. The groups point to several specific examples to illustrate their case, including the structure and process of the so-called "RPA Committee", established by the Council to design Steller sea lion conservation measures for the 2001 fisheries to substitute for those prescribed by NMFS, and a Council meeting where conservation group representatives were subjected to pejorative and possibly threatening treatment that appeared to be sanctioned or endorsed by the Council Chairman.

In the view of the evaluation team, the management system applicable to the North Pacific pollock fishery is very open and includes numerous mechanisms to encourage participation by all interested stakeholders. The administrative procedures followed by the NPFMC are commendable for their stability, clarity and accessibility. The system's progress toward making more robust use of NEPA holds the promise of even greater transparency and engagement. The immense volume of written and electronic information made available to the evaluation team is particularly compelling evidence of the openness and accountability of the management system.

The evaluation team would have assigned a much higher score to this indicator if it were not so clear that the system, despite its various venues for public participation, has yet to fully accommodate conservation stakeholders. In saying this, the team recognizes that the management system must uphold the requirements of the Magnuson-Stevens Act and other laws that seek to achieve ends other than or in addition to conservation. And the team recognizes that a regional fishery council whose members are appointed through a

[69] http://www.fakr.noaa.gov/npfmc/Newsletters/0603news.pdf

deliberately political process cannot be detached from regional political and policy concerns.[70]

But even with those factors in mind, and granting that conservation stakeholders, like all stakeholders, are occasionally prone to unwise action or mistaken understanding, the evidence is strong that the system's present inability to enfranchise their concerns as an integral part of the management process has produced instability and unpredictability in the management system, and consumed huge amounts of time, attention, and funding in a quest to resolve those concerns after the fact. The history of litigation around this fishery, described at length above, is compelling evidence of the problem. It is also evident that the instability in the management system generally attributed by the industry and some agency personnel to the actions of the conservation stakeholders is closely matched by the instability and unpredictability attributable to the actions of commercial fishery interests through their invocation of the federal legislative process to address conservation, allocation, and other issues through "riders" and other means.

While no specific conditions are required, the evaluation team would strongly recommend that the persons responsible for appointing individuals to the Council, the SSC, and ad hoc groups take a more forward thinking and practical approach to identifying and including persons with demonstrated experience in understanding and incorporating conservation community concerns into traditional management systems.[71] .[72] In making this recommendation, the assessment team intends to align itself generally with the recommendations for structural and statutory reform of the fishery management councils made by the U.S. Commission on Ocean Policy and the Pew Oceans Commission. For example, the U.S. Oceans Commission's 2004 Preliminary Report states:

> The Magnuson–Stevens Act states that the Secretary of Commerce must "to the extent practicable, ensure a fair and balanced apportionment … of the active participants" on the RFMCs. However, the Secretary can only choose RFMC members from the slate of candidates forwarded by the governors. The governors themselves are under no legal obligation to put forth a fair and balanced slate of candidates. Under the Act,

[70] It is beyond the scope of this report to contemplate in depth, but worth raising the issue that contemporary approaches to stakeholder involvement in consensus-oriented natural resource management, if applied to North Pacific groundfish management, would, at a minimum, likely call for a different participatory structure than that embodied in the NPFMC. See, for example, the principles for stakeholder involvement in environmental protection and enhancement produced by the Aspen Institute, available at www.aspeninst.org/dir/polpro/eee/Alternate.Path/Chapter5.html or the many sources included in the bibliography of environmental conflict resolution resources maintained by the U.S. Institute for Environmental Conflict Resolution, available at http://www.ecr.gov/ecr_bib.htm. It would be interesting, and perhaps productive, to try to conceptualize the North Pacific as a "watershed", in the sense that natural resource managers have come to use in identifying the proper scope, scale, and interrelationship of issues and interests for decisionmaking. See, for example, Cannon, Choices and Institutions in Watershed Management, 25 Wm. & Mary Envtl.. L. & Pol'y Rev. 379 (2000); National Research Council, New Strategies for America's Watersheds (1999).

[71] The United Nations has recognized the central role played by non-governmental conservation organizations in sustainable resource management. See *Agenda 21*, U.N. Div. for Sustainable Dev., U.N. Doc. A/CONF/151/26 (Vo. III), Ch. 23 and 27; www.un.org/esa/sustdev/documents/agenda21. See also, Food & Agric. Org. of the U.N., Code of Conduct for Responsible Fisheries, Art. 7.1.2. (2002); www.fao.org/fi/agreem/codecond/codecon.asp.

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their only obligation is to ensure that each candidate is "knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned." This loophole has resulted in uneven representation on some RFMCs. The governors are not required to recommend candidates from outside the fish harvesting industry, such as consumer groups, academia, subsistence fishermen, or environmental organizations, although these perspectives could help achieve a more balanced management regime. As it stands, the fishing industry representatives who make up the majority of RFMC members may tend to favor economic interests over the long-term sustainability of the stocks. The relatively narrow representation on RFMCs may also fuel legal challenges to fishery management plans based on allegations of conflict of interest—although it should be noted that industry groups challenge fishery management decisions as frequently as public interest groups.

Amendments are needed to ensure that RFMC membership is balanced among competing user groups and other interested parties, and that fishery management plans reflect a broad, long-term view of the public's interests. Identifying the best mix will require knowledge of the federal fishery management process and an understanding of other factors affecting ocean ecosystems. This expertise resides in the NOAA Administrator, not the Secretary of Commerce who is currently responsible for appointing RFMC members.

Recommendation 19–12. Congress should amend the Magnuson–Stevens Fishery Conservation and Management Act to require governors to submit a broad slate of candidates for each vacancy of an appointed Regional Fishery Management Council seat. The slate should include at least two representatives each from the commercial fishing industry, the recreational fishing sector, and the general public.

Recommendation 19–13. Congress should give the Administrator of the National Oceanic and Atmospheric Administration responsibility for appointing Regional Fishery Management Council members with the goal of creating councils that are knowledgeable, fair, and reflect a broad range of interests.[73]

In a similar vein, the Pew Oceans Commission stated:

[T]he management structure and process suffer from regulatory capture, a state of affairs in which government regulators (in this case, fisheries managers) have come to believe that their role is to defend the interests of the regulated community rather than promote the public interest. Resource users— principally commercial interests—drive management decisions.[74]

[73] U.S. Commission on Ocean Policy, Preliminary Report, 219 (2004).
[74] Pew Oceans Commission, America's Living Oceans: Charting a Course for Sea Change 44-45 (2003)

This recommendation may seem naïve given the intense, embedded politics of the Council process, but compliance with the recommendation would anticipate and be consistent with the general direction of change in US fishery and marine resource management. The Council, and the fishery, might very well benefit by acting ahead of the curve.

Indicator 3.3 The management system assesses relevant information pursuant to objective, fair, equitable processes. *[Relates to MSC Criterion 3.2]*

Elements considered in scoring:

- Burden of proof/persuasion applied to types of proposal or category of stakeholder
- Efforts to quantify relative risks borne by different species, ecological systems, and stakeholders as a result of uncertainty

100 Scoring Guidepost

- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system does not place an unfair burden of proof on proposals of a certain type or arising from a particular category of stakeholder
- The management system attempts to quantify and document the degree of risk imposed on different species, ecological systems, and stakeholders by particular decisions or courses of action, particularly in light of scientific uncertainty.

80 Scoring Guidepost

- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system attempts to characterize and reveal the risks of harm to different species, ecological systems, and stakeholders arising from management decision making.

60 Scoring Guidepost

- The management system regularly fails to analyze potentially significant information concerning the fishery or its impacts
- The management system lacks a rational approach to identify and reduce sources of uncertainty affecting the quality of management decision-making

SCORE 80

The evaluation team was provided with information showing that the North Pacific Council solicits recommendations for GOA groundfish FMP amendments on an annual basis, encouraging stakeholder participation in the process. Those proposing plan amendments file a standard form, indicating that all responses are evaluated, at least in this respect, based on a common set of standards. All proposed actions are submitted to the Council's AP prior to consideration by the Council, and all measures involving scientific issues are presented to the SSC as well as the AP. In addition, all stakeholders are provided equal opportunity to attend Plan Team, Council, AP and SSC sessions to ask questions, make comments or provide testimony prior to action on the item.

NEPA-mandated environmental reviews are routinely prepared in connection with management measures affecting the GOA pollock fishery. These documents, which with rare exception are published for public review and comment, evaluate the impacts which the proposed measures are expected to have on the marine environment, including fish stocks (target and non-target), birds, marine mammals and other components of the marine ecosystem(s) affected by the proposed measure. These documents also evaluate the impacts that the proposed measures will have on fishing communities, native groups, small entities and various other components of the fishing industry (vessel and gear types, industry sectors, etc.) as well as the product forms produced by the fishery, product mixes, consumers, and the local, regional and national economies.

Conservation stakeholders' comments on this indicator are included under Indicator 3.1

The management system for these fisheries, defined in the broadest sense, has come to enfranchise the interests of all major stakeholders and is making meaningful progress toward understanding the full range of impacts from the fisheries. All gear groups participate in the system, and there is no evidence that the system unduly favors one such group over others.

The evaluation team would not assign the score it did to this Indicator were it to define the management system to include only the administrative or regulatory process overseen by NMFS and the Council. But having included the federal judicial and legislative branches within the definition of the management system, it is clear that all stakeholders ultimately have access to a mechanism to place relevant information before appropriately impartial decision-makers. The score would have been higher but for the fact, described at length in previous discussions, that the NMFS-Council process appeared, in certain instances, to struggle unsuccessfully to develop and apply information on Steller sea lion conservation needs.

<u>Indicator</u> 3.4 The management system provides for timely and fair resolution of disagreements *[Relates to MSC Criteria 3.2, 3.5]*

Elements considered in scoring:

- Established, routine system available to all
- Objective decision maker
- Explanation of decision

100 Scoring Guidepost

- The management system has established mechanisms for resolution of disputes at the principal levels of, and for major issues arising within, the system
- The management system provides for appropriate documentation of the nature and resolution of disputes
- The management system's dispute resolution procedures show evidence of being open to and used by a variety of participants and stakeholders
- The management system's dispute resolution procedures show no evidence of a pattern of discrimination against any participants or significant stakeholder interest

80 Scoring Guidepost

- The management system has established mechanisms for resolution of significant disputes arising within the system
- The management system's dispute resolution procedures show evidence of being open to a variety of participants and stakeholders

60 Scoring Guidepost

- Although dispute resolution mechanisms are in place, the management system fails to demonstrate meaningful progress toward resolution of outstanding disputes

SCORE 80

The process by which the pollock fisheries are managed follows a hierarchical framework of successive deliberations intended to resolve disagreements or uncertainties, particularly as to technical matters. For many years, the process has been dominated by catch allocation disputes. The principal source of disagreement within the management system centers on disagreements between conservation stakeholders and the industry over appropriate harvest control measures to protect Steller sea lions, other pollock predators, non-target species, and marine habitats. The NPFMC is now in the process of developing a quota based cooperative system in the GOA, and determining allocations is expected to be contentious.

Throughout the deliberative process, Council and NMFS staffs are required to prepare analyses relevant to the issues under discussion, and interested parties are routinely invited to participate. The Secretary of Commerce remains the final decision maker on all proposed management measures. FMP amendments, and the proposed rules implementing such measures, are published in the Federal Register to allow for public comment. All comments are responded to in writing if and when a proposed rule is issued as a final rule. In addition, NMFS issues a Record of Decision explaining the rationale for its action. Stakeholders have the right to challenge a Secretarial action in a U.S. court of law. In addition to privileges afforded stakeholders under the U.S. Constitution, Section 305(f) of the Magnuson-Stevens Act provides for judicial review of regulations promulgated by the Secretary under the Act.

The conservation stakeholders (Marz and Stump, 2002) advised the evaluation team that the management system does not provide for timely and fair resolution of disagreements. The groups argue that NMFS has shown an unwillingness or inability to resolve disagreements by its failure to produce authoritative NEPA analyses on the groundfish fisheries, including evaluation of the cumulative impacts of fisheries management actions on benthic invertebrates, groundfish, marine mammals, seabirds, or fishing communities. The conservation stakeholders assert that: “At virtually every juncture, management has avoided taking steps, unless forced by court order, that would lower TACs and spread out the fishery in space and time to protect sea lions.”

In the view of the evaluation team, the management system for these fisheries regularly addresses and resolves disagreements involving a wide range of parties and issues. The strength of the dispute resolution system is greatest at the higher levels of the process, but weaker at lower levels, where certain disagreements seem to be chronic. In assigning this score, the team recognizes that the current process does not give rise to confidence that some important issues will regularly be resolved in a fair or timely way at the agency or council levels. Too many disputes have festered for too long at those stages of the management system, leaving the courts and federal legislature to tackle issues that could have been resolved in the region. Here, too, the management system would benefit from an independent retrospective analysis of the manner in which certain disputes arose in and were addressed by the management system in order to determine whether the substance or procedure followed could have been improved.

Indicator 3.5 The management system presents managers with clear, useful, relevant information, including advice *[Relates to MSC Criterion 3.2]*

Elements considered in scoring include:

- Presentation of alternatives
- Characterization of risk, uncertainty, consequences
- Opportunity for deliberation

100 Scoring Guidepost

- The management system regularly presents decision makers with a reasonable number of carefully analyzed alternatives for action that fall in, and extend to the margins of a range that includes all legally permissible options
- The management system provides decision makers with time and opportunity for deliberation in a manner suitable for the nature of the decisions under consideration
- The management system shows evidence of a pattern of behavior by decision makers that reveals that they have found the information provided to them to be useful, adequate in scope and detail, and otherwise appropriate to the performance of their duties

80 Scoring Guidepost

- The management system regularly presents decision makers with a reasonable number of carefully analyzed alternatives for action that fall in a range that includes all legally permissible options proposed by stakeholders
- The management system's decision makers show evidence of relying consistently upon the information provided to them.

60 Scoring Guidepost

- The management system's decision makers repeatedly base decisions on information or factors not developed or presented through the "official" or routine process
- The management system's decision makers repeatedly act in a manner contrary to the advice developed or presented through the "official" or routine process
- The management system's decision makers appear frequently to be unaware of the consequences of or risks inherent in their decisions

SCORE 75

The management system is subject to NEPA, which requires that proposed federal regulatory actions be analyzed and that the analysis be adequate in scope and content and include a range of reasonable alternatives. In addition to NEPA requirements, Presidential Executive Order 12866 requires that the costs and benefits of all major actions on affected entities be analyzed, and the Regulatory Flexibility Act (RFA) requires that the impacts of proposed measures on small entities be analyzed. In addition, the Magnuson-Stevens Act's National Standards require that the impacts of proposed management actions on coastal communities be minimized and that allocation decisions be "fair and equitable" to any fishermen.

The Council also reviews recommendations from its AP and SSC on virtually all measures and, after public comment, the Council deliberates the merits of each proposal in open, public sessions that are routinely recorded on tape. Copies of recordings are available to the public at a minimal cost.

NMFS staff from the Alaska Fisheries Science Center (AFSC) and the Alaska Region office, Council staff, state fisheries agencies and, from time to time, outside experts develop analyses for Council consideration. The analyses are prepared by individuals with a wide range of expertise, including fisheries biology, marine mammology, economics, and social anthropology, among other disciplines.

The conservation stakeholders (Marz and Stump, 2002) cite flaws in the process, emphasizing that the Ecosystem Considerations chapter in the SAFE report is an example that illustrates the problems with the presentation and use of relevant information. "While the Ecosystem Considerations chapter of the SAFE report contains useful information, there is no clear explanation of how this information is incorporated into the SAFE document's other chapters."

In the view of the evaluation team, the management system is provided with a large and generally reliable and useful body of information and advice, particularly with respect to stock assessment and some socioeconomic matters. The management system also receives a commendable amount of ecosystem information, though as noted previously, that information is not yet presented in a manner that evidently influences decision-making. [75]

The evaluation team would have assigned a higher score to this indicator but for the management system's present lack of compliance with NEPA, as determined by the federal courts. NEPA is the primary tool for the assembly and presentation of environmental information relevant to United States federal agency action. In those instances where a federal action may have significant environmental impacts, NEPA's role is ensure that agency decision makers are presented with a reasonable range of carefully evaluated alternatives to achieve the particular purpose or need propelling the agency to make the decision to act. The process is to be informed by significant public involvement and, where appropriate, cooperation with other government agencies. In the context of contemporary natural resource management in the United States, robust and strategic NEPA compliance forms the heart of good decision-making.

The evaluation team did not receive information from any source indicating that the management system, particularly at the NPFMC level, receives and considers a meaningful range of carefully evaluated alternatives for action. It is clear that the Council considers different TAC levels, but less evident that evaluated alternatives are presented on other matters. In this respect, the team was concerned by evidence suggesting that the Council makes decisions to act in specific ways that have not previously been evaluated by federal agency officials in terms of legal or policy constraints, requiring the agency to craft after-the-fact analyses that attempt to validate Council action, rather than inform it.

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the Condition required under Principle 3, Indicator 2.2 above.

SCS Criterion 4

The management system applies information through implementation of measures and strategies (by rule or by voluntary action of fishery) that demonstrably control the degree of exploitation of the resource in the light of the natural variation in ecosystems

Subcriterion 4.1 The management system applies appropriate techniques and tools

<u>Indicator</u> 4.1.1 Catch levels are set to maintain high productivity of the target population and the ecosystem *[Relates to MSC Criterion 3.10]*

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[75] The score assigned to this indicator rests heavily on the ultimate substance and legal fate of the PSEIS. If that analysis fails to offer legitimate management alternatives, or otherwise comply with the applicable court order, this score will likely need to be revised and additional conditions imposed.

100 Scoring Guidepost

- Catch levels are set regularly in a manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are set regularly in a manner directly tied to, and limited by, specific ecological productivity goals, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs
- No evidence that the productivity of target populations, including population subcomponents, is declining as a consequence of harvest levels
- No evidence that ecological productivity is declining as a consequence of harvest levels
- Application of precautionary approach

80 Scoring Guidepost

- Catch levels and/or catch arrangements are regularly set in a manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are regularly set in a manner that considers ecological productivity goals, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs

60 Scoring Guidepost

- Catch levels are set in a manner that is indistinctly or unreliably related to impacts of harvest on target species or the ecosystem
- Catch levels are not appropriately adjusted in a timely manner to respond to information indicating that harvest is having unacceptable adverse impacts on target species or the ecosystem

SCORE 70

The issues covered by this indicator are discussed in greater detail under MSC Principles 1 and 2. The panel’s view of the issues behind this indicator can be summarized this way: The management system’s choice of catch levels or the environment or both have caused GOA pollock populations to remain relatively low and in decline, although most recently they have seen an very slight upswing in biomass. It is not at all clear how much of the credit for “success” or blame for “failure” measured in terms of pollock abundance should properly be assigned to the management system itself. It is clear that the measures that have been taken to set catch levels have kept them close to the ABCs in most years over an extended period of time.

The evaluation team observes that the Council and NMFS do not set catch levels explicitly to maintain high productivity of the ecosystem, per se. ABC-setting and TAC-setting in the management of the North Pacific groundfish fisheries do not quantitatively incorporate the needs of predators or other ecosystem-level considerations into conventional single-species catch levels.

However, the Gulf of Alaska pollock TAC since 1992 has been apportioned spatially and temporally to reduce impacts on Steller sea lions. Amendments to the FMP have incorporated ecosystem and prey-species protection measures including those which prohibit fisheries on forage fish, limit PSC bycatch, and protect essential fish habitat, and so forth. All of these amendments place limits on and are implicitly considered when setting pollock catch limits.

The biomass of pollock in the GOA varies but this variation appears to be tied to environmental and climatological factors rather than fishing activities. (See the 2001 FOCI Year Class Prediction section beginning on page 6 of the 2001 SAFE, and the analyses provided by Martin Dorn in this report) No studies have shown significant ties between pollock fishing mortality and biomass at current or historic harvest levels.

Biomass estimates of pollock in the GOA have decreased in recent years. However, recent survey work aboard the NOAA research vessel *R/V Miller Freemen* found larger number of pollock in waters where they do not normally occur, which may reflect on the overall biomass available.

The conservation stakeholders (Marz and Stump, 2002) pointed out to the evaluation team that there is no clear policy framework or procedure within the conventional single-species assessment procedures for incorporating non-quantitative information on impacts to food webs, protected species, habitats, etc. Specifically, some stakeholders note that "fishing rates and levels of catch that are deemed “conservative” relative to the conventional MSY yardstick may have considerable peripheral impacts on food webs and habitats that are not reflected in a simple comparison of catch to the estimated “biomass” of a target stock in the status quo TAC-setting process.”

The Gulf of Alaska pollock fishery score for this indicator was based on the fact that the stock there is in persistent decline, with some spawning aggregations reduced by 90 percent from recent levels. There is no empirical evidence that harvest levels are set to recover spawning populations, especially if the impact of environmental influences is properly incorporated.

The evaluation team recognizes that uncontrollable environmental factors influence the abundance of pollock stocks in the North Pacific. It may well be that harvest levels in the Gulf of Alaska are having little or no impact on the long term abundance of that stock (see Indicator 1.1.2.1 under Principle 1), suggesting that the Gulf fishery ought to achieve a higher score. However, in the face of significant environmental influences that may well be the determinative factor in current GOA Pollock abundance, it is still of significant concern to the evaluation team that the harvest strategy utilized has not been robustly tested against a variety of possible scenarios including declining biomass as a result of environmental variability. The evaluation team believes there should be a substantive body of work showing what TAC levels can and should be utilized in the GOA Pollock fishery at low levels of abundance.

Condition

To retain certification, the fishery must implement the harvest level and biomass level related conditions associated with Indicators 1.1.1.5 and 1.1.2.1 under Principle 1 and Indicator 1.1 under Principle 2.

<u>Indicator</u> 4.1.2 Restricts gear and practices to avoid catch of non-target species, minimize mortality of this catch, and reduce unproductive use of non-target species that cannot be released alive *[Relates to MSC Criterion 3.12]*

100 Scoring Guidepost

- The management system applies an established, widely accepted program to minimize catch of non-target species, including specific goals, such that the take of these species does not exceed established thresholds where appropriate, or is precautionary.
- The management system has achieved a fishery-wide, multi-year trend of reduced catch of non-target species through restrictions in gear and fishing practices
- The management system has achieved a fishery-wide, multi-year trend of reduced discards through restrictions in gear and fishing practices
- The management system provides for productive economic or social uses of non-target species that are not released alive

80 Scoring Guidepost

- The management system applies an established, widely accepted program to minimize catch of non-target species, including specific goals, such that the take of these species does not exceed established thresholds where appropriate, or is precautionary.
- There is evidence of a fishery-wide, multi-year trend of reduced catch of non-target species
- There is evidence of a fishery-wide, multi-year trend of reduced non-productive economic or social use of non-target species

60 Scoring Guidepost

- Fishery management system demonstrates significant resistance to adoption of measures and practices to minimize catch or avoid non-productive use of non-target species

SCORE 90

The Council has spent a great deal of time and effort working to reduce bycatch in the groundfish fisheries off Alaska. Management standards that directly addressed this issue for the GOA include Amendment 21 in 1991 that instituted PSC caps, Amendment 24 in 1992 that further refined bycatch measures, and Amendment 49 in 1998 that required the retention of all pollock and cod and provided incentives for fishermen to avoid unwanted catch. In addition, peer pressure has been brought to bear on the harvesting sector by publishing the names of vessels and their discard rates on a weekly basis as authorized in 1994 (accessible at http://www.fakr.noaa.gov/2002/pscinfo.html).

Bycatch data are calculated using data from harvest and processor observers and from processor weekly production reports. This data is presented online to allow anyone to monitor the progress of the fishery. It is a strong incentive to all to have this information readily available so that there is little doubt as to how the fisheries are doing in terms of minimizing bycatch. Various current reports including catch by species, discards, PSC catch, and so forth, all updated weekly, are accessible at: http://www.fakr.noaa.gov/2002/2002.htm. Historic annual reports in the same format are accessible at: http://www.fakr.noaa.gov/sustainablefisheries/catchstats.htm.

The bycatch species of most interest in the pollock fishery is salmon. The catch of salmon in the GOA pollock fishery has decreased 80 percent since the early 1990s. This decline is related to increased management emphasis on clean fishing standards and higher utilization of catch. The NPFMC staff prepared paper "Salmon Bycatch in the Gulf of Alaska Groundfish Fisheries 1993-2000" is accessible at http://www.fakr.noaa.gov/npfmc/Reports/reports.htm

The economic use of non-target species that are not able to be released alive has been a special area of focus in the GOA. The Salmon Donation Program was instituted beginning in 1996 with Amendment 29 to the GOA FMP. This program allows the distribution of Pacific Salmon taken as bycatch in the groundfish trawl fisheries off Alaska to economically disadvantaged individuals through a NMFS authorized distributor. The program was expanded to include halibut by Amendment 50 in 1997. To date, several millions of pounds of salmon and halibut have been donated to food banks by the fishing industry.

Notwithstanding the considerable efforts made by the Council and NMFS to address bycatch in the pollock fisheries, the conservation stakeholders (Marz and Stump, 2002) pointed to an extensive set of concerns regarding issues under this indicator and indicators 4.1.3 and 4.1.5. Their concerns included:

- Limitations of bycatch caps as a management tool to reduce bycatch;
- Problems of the North Pacific Observer Program in bycatch monitoring;
- Limitations of existing gear closure areas as a management tool to reduce bycatch;
- North Pacific fishery bycatch regulations are not adequate as designed to address the environmental impacts of incidental catch in the pollock fisheries;
- Salmon bycatch in the pollock fisheries; and
- "Other species" bycatch in the pollock fisheries.

These issues are discussed at considerable length in the sections of this report covering MSC Principle 1 and Principle 2.

The evaluation team believes that the management system has done an excellent job of reducing catch of non-target species and making productive use of those that are caught. In many respects, this system is among the best in the world.

Indicator 4.1.3 Accounts for catch of non-target species *[Relates to MSC Criteria 3.10, 3.17]*

100 Scoring Guidepost

- The management system requires real-time, reliable monitoring of and accounting for catch and use or discard of non-target species throughout the fishery
- The management system has achieved continued improvement in the accuracy and precision of monitoring and accounting of catch and use or discard of non-target species

80 Scoring Guidepost

- The management system requires reliable, timely monitoring of and accounting for catch of non-target species and use or discard of that catch throughout all significant components of the fishery

60 Scoring Guidepost

- Information available to managers on catch of non-target species is untimely, imprecise, or inaccurate

SCORE 80

NMFS approved a final rule instituting a comprehensive observer program on February 12, 1990.[76] The observer program requires 100% observer coverage on all vessels over 125 feet in length and 30 percent coverage on vessels 60 to 125 feet in length. Observers are stationed at onshore processing plants as well.[77]

Observers record catches of target and non-target species and what was retained and what was discarded. These reports are filed electronically with NMFS.

The conservation stakeholders' concerns on this matter are discussed under indicator 4.1.2.

In the view of the evaluation team, the Gulf of Alaska fishery barely received a passing score because the monitoring system there, while strong in some important ways, presents at least two weaknesses. The Gulf fleet is subject to no more than 30 percent observer coverage, with

[76] Those rules were recently amended. A useful description of the regime appears at http://www.fakr.noaa.gov/frules/fr715.pdf.

[77] http://www.afsc.noaa.gov/refm/observers/default.htm

no coverage on smaller boats, and the observer program is subject to procedures that may bias observer data.

<u>Indicator</u> 4.1.4 Minimizes adverse impacts on habitat *[Relates to MSC Criteria 3.10, 3.13]*

100 Scoring Guidepost

- The management system requires continuing, comprehensive effort to identify, document, and assess the risks of fishery impacts on habitat
- The management system has demonstrated a pattern of actions to restrict fishery gear and practices to reduce adverse impacts on habitat
- The management system has achieved a demonstrated trend of reductions in adverse habitat impacts from fishery

80 Scoring Guidepost

- The management system requires continuing, comprehensive effort to identify, document, and assess risks of fishery impacts on habitat
- The management system has taken significant actions to restrict fishery gear and practices to reduce fishery impacts on habitat

60 Scoring Guidepost

- Fishery shows evidence of causing significant, unmitigated damage to habitat

SCORE 80

As discussed for various indicators elsewhere in this paper, the GOA management process continually re-evaluates fishing methods, impacts, effects, and risks. The ongoing work on essential fish habitat will lead to additional management measures designed to protect the marine environment. Some of these regulations, such as Amendment 26 closing areas around Kodiak Island to trawling in order to preserve juvenile crab and their habitat, are in the form of direct action. Likewise the trawling ban in the eastern GOA is to protect habitat. Others, such as Amendment 49 requiring full retention of pollock and cod, use economic incentives to accomplish habitat and stock conservation goals. In addition, BOF closes areas for habitat protection including bottom trawling closures in most state waters in the GOA.

Pelagic trawling accounts for 90 percent of the pollock fishery in the GOA. This is greatly reduced from practices a decade ago when much of the harvest was from benthic trawling. Taken together with reductions in pelagic trawl PSC catch, bycatch, and waste, the marine habitat is less impacted in today's fishery.

Experimental fishing permits became available following implementation of Amendment 22 in 1992. These permits allow harvesters to experiment with innovative trawl arrangements and in new areas without having to sacrifice the economic losses of experimentation with such practices during short, competitive fishing seasons. It is during many of these experimental fisheries that observer and trawl innovations have been tested and subsequently implemented or adopted by the fleet.

There are also numerous laws and regulations enforced by the U.S. Coast Guard regarding preventing oil spills, prohibitions on disposing of plastics and other materials, etc. The U.S. is a party to the International Convention for the Prevention of Pollution from Ships, a treaty that regulates the disposal of wastes generated by normal operation of vessels.[78]

The conservation stakeholders advised the evaluation panel that existing trawl closure areas do not encompass pelagic habitats for pollock and that the only pelagic deepwater habitat areas in the North Pacific that are currently afforded some level of protection from groundfish fisheries are portions of the designated Steller sea lion at-sea foraging habitats in Shelikof Strait and parts of the Sea lion Conservation Area (SCA) off the eastern Aleutian Islands. Both areas are major pollock spawning grounds, and pollock is fished intensively at spawning time.

The conservation stakeholders also observed that existing trawl closure areas afford no habitat protection in the deeper waters of the continental shelf and slope of the west-central GOA. The groups advised the evaluation team that existing trawl closure areas are not designed to protect essential fish habitat, such as the heavily exploited spawning grounds of pollock, because there are no explicit habitat protection measures for exploited groundfish stocks at any life history stage.

The evaluation team wishes to emphasize that the team interprets the term "habitat" in this indicator to refer only to pollock habitat, not all aspects of habitat throughout the ecosystem. In the team's view, the management system has taken significant steps to minimize habitat impacts from the fishery. Time and area closures, restrictions on harvest of food fish (e.g., herring, capelin), limits on bottom trawling, and nationwide limits on discharge of various forms of waste all represent measures to protect pollock habitat.

The evaluation team considered the fact that NMFS has yet to designate essential fish habitat as required by the Magnuson-Stevens Act, though the agency is in the process of doing so.[79] The court's opinion in the EFH litigation specifically criticized NMFS environmental assessments for describing alternatives but not analyzing them or explaining their environmental impacts. NMFS is under substantial burden to produce new analyses that reach to the fullest limits of the agency's analytical abilities as to habitat protection. It is reasonable to expect that the North Pacific Council will be presented with a considerable body of new information and analysis that will enable the management system to take additional steps to benefit pollock habitat.

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[78] See the websites of the U.S. Environmental Protection Agency's (EPA's) Office of Wetlands, Oceans and Watersheds **http://www.epa.gov/owow/OCPD/marpol.html** and the U.S. Coast Guard's Office of Marine Safety and Environmental Protection http://www.uscg.mil/hq/g-m/gmhome.htm.

[79] http://www.fakr.noaa.gov/habitat/seis/default.htm

The Gulf of Alaska fishery did not receive a higher score because of the continued use of bottom trawling in that fishery and the comparatively limited use of closed areas.

Indicator 4.1.5 Does not use destructive fishery practices *[Relates to MSC Criterion 3.14]*

100 Scoring Guidepost

- The management system affirmatively prohibits fishery or operational practices that damage or destroy natural geologic, biologic, or chemical features or characteristics of the aquatic area in which the fishery occurs, except those impacts that are physically unavoidable consequences of authorized uses of fishing gear

80 Scoring Guidepost

- The fishery does not use explosives or toxic chemicals to kill or stun aquatic species.

60 Scoring Guidepost

- Fishery management system lacks reliable mechanism to determine whether participants use destructive fishery practices

SCORE 90

Fishing methods that have less impact on the environment are routinely encouraged over more intrusive ones through direct prohibitions, gear allocations, and economic incentives. Driftnets, bottom tangle nets, and longlined-pots have all been banned in the GOA groundfish fisheries. For additional information, see 50 CFR 600.725, which provides the list of authorized fishing gear permitted in U.S. fisheries. This citation in the Code of Federal Regulations states that only trawl, hook and line, handline, longline, pot and trap gear are permitted in the North Pacific commercial groundfish fishery. These gear types are commonly used in commercial fisheries internationally and fishing with such gear is not considered to be a destructive fishing practice. (See Code of Federal Regulations http://www.access.gpo.gov/nara/cfr/.**)**

The conservation stakeholders' concerns on this matter are discussed under Indicator 4.1.2.

The evaluation team is of the view that the GOA pollock fishery does not use destructive fishery practices in their harvest of pollock and there is good information to prove it. The team did not consider gear entanglement in this indicator, because that issue is addressed elsewhere.

Indicator 4.1.6 Provides for rebuilding and recovery, where applicable *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost

- The management system sets and has demonstrated a trend toward achieving rebuilding and recovery goals for all over-fished stocks
- The management system does not allow fishing on any stock impacted by the fishery that has declined below limit reference points until the fishery can be demonstrated to be significantly above the limits imposed.

80 Scoring Guidepost

- The management system sets and has demonstrated a trend toward achieving rebuilding and recovery goals for all over-fished stocks

60 Scoring Guidepost

- The management system fails to reliably ascertain when stocks are over-fished, including those stocks not subject to targeted fisheries at the present time, but depressed due to earlier fishery activity
- The management system does not respond in a timely manner to information regarding the need to rebuild and recover stocks.

SCORE 75

As we pointed out under Principle 1, Indicator 2.1.1, the control rules reduce exploitation rates for tiers 1 to 3 at low stock size. However, there is little demonstrated empirical evidence or simulation results to suggest whether this is adequate to promote rapid recovery. Theoretical results (e.g. Thompson, 1998) assume resilience and rapid recovery. Empirical evidence for the Bogoslof area and the "donut hole" suggest very slow recovery rates once stocks are depleted (Bogoslof continues to decline with no fishing). There is also empirical evidence that exploitation rates increased as stocks declined in both the GOA and the Aleutian Islands

The team assigned the score to the Gulf of Alaska fishery because of the continued downward trend for Gulf of Alaska pollock spawning stock and biomass. The team notes that although the model described in the recent SAFE reports shows that Gulf of Alaska stocks should rebound if fishing pressure is reduced, the results suggests that the model may not be accurate.

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the same conditions that are required under indicator 1.1.1.5 for Principle 1. No additional work would be required at this time.

<u>Indicator</u> 4.1.7 Applies closures or restrictions when catch limits reached *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost

- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent exceedence of catch limits by all participants in the fishery
- The management system has a record of identifying and eliminating factors in season that impair the effectiveness of catch limit-related closures or restrictions.

80 Scoring Guidepost

- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent exceedence of catch limits by all participants in the fishery
- The management system has a record of identifying and eliminating factors that impair the effectiveness of catch limit-related closures or restrictions.

60 Scoring Guidepost

- The management system applies closures or restrictions in a manner that repeatedly has allowed significant exceedence of catch limits

SCORE 90

NMFS consistently issues notices to close the pollock fishery in order to stay within the designated TAC level.

The management system has undertaken numerous measures to improve data collection and fishery accountability. Examples include mandatory observers, weekly processor reports, public listing of individual vessel PSC catch rates, and requiring vessel transponders. All of these are aimed at ensuring that catch reporting is timely, accurate, and can be used effectively to manage the fishery. For instance, daily production reports are required by noon following the day of catch.[80]

The team assigned the score to the Gulf of Alaska fishery because of the recent history of exceedences in the fishery.

<u>Indicator</u> 4.1.8 Incorporates no-take zones, and MPAs, or other mechanisms, where appropriate to achieve harvest limits and ecosystem protection objectives *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost

- The management system has demonstrated a consistent ability and willingness to establish no-take zones or MPAs or other mechanisms where appropriate in order to achieve harvest limit or ecosystem protection goals

[80] http://www.fakr.noaa.gov/sustainablefisheries/catchaccounting.htm

- The management system has identified criteria and standards for establishment of control mechanisms.

80 Scoring Guidepost

- The management system has established no-take zones, MPAs, or other control mechanisms, where appropriate

60 Scoring Guidepost

- The management system has established control mechanisms that have produced no significant benefit to target species or the ecosystem

SCORE 79

There are numerous closed areas in effect for the GOA trawl and other fisheries, which include closures affecting the pollock fishery. Perhaps the most prominent issue pertains to closures in areas designated as Steller sea lion critical habitat. On January 8, 2002, NMFS published an emergency rule for management of the 2002 GOA pollock fishing season (cite provided earlier), which included management measures closing vast areas of the GOA management area to pollock fishing. Biological Opinion #4 provides the rationale for the closures imposed on pollock fishermen. The 2002 area closures to avoid competition between foraging Steller sea lions and pollock fishing are the latest in a series of rules first imposed by the NMFS in 1992 through Amendment 25. Other restricted areas in the GOA include the pinnacles closed area near Sitka and the Shelikof Straits conservation area between Kodiak Island and the Alaska Peninsula where pollock fishing is restricted in known spawning areas. The use of closed areas either to specific gear types or in general, has been in use in the GOA for many years. Closed areas for trawling around Kodiak Island have been discussed elsewhere in this document. Ecosystem protection is also accomplished by setting temporally spaced fishing seasons to restrict bycatch (see Amendment 24) and by restricting the take of target, bycatch, and prohibited species.

The fishery employs time and area restrictions of some sort and, in total, these measures apply widely throughout the region. There is no question that the management system recognizes that closures may have benefits for various components of the ecosystem, including the pollock themselves and the endangered Steller sea lion. That said, the team was presented with no evidence to suggest that the management system has yet evaluated the benefits of the closures.[81] In this regard, it is important to note that the team interprets this indicator to

[81] Trustees at 29-33. Note that the Administrator of NOAA Fisheries recently testified in support of use of MPAs in a fashion that may well be pertinent to the sea lion conservation issue, saying "In my experience MPAs are best used in combination with, and to complement, other management tools. However, the integration of these various tools is often quite challenging. In Charleston I mentioned the difficulty we face in meeting the requirements of both the Magnuson-Stevens Act and the Endangered Species Act with their related, yet at times conflicting, mandates. As the Commission reviews the laws that serve as our current ocean governance framework I recommend that you also consider ways to better integrate MPAs

include the concept that closures need to be established and monitored in a way that, in an appropriate amount of time, demonstrates the benefits of closures to the ecosystem and the fishery itself. The team feels strongly that the use of closures in these fisheries needs to be subjected to controlled experimentation, and is aware that the NRC recommended such a process. The team was concerned by evidence that the management system may be moving toward significant changes in the current SSL-related closures without determinative evidence of the current closures' effects on sea lions or other components of the marine ecosystem.

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the conditions described under Principle 2, Indicator 2.3.1.

Indicator 4.1.9 Minimizes operational waste *[Relates to MSC Criterion 3.15]*

100 Scoring Guidepost

- The management system has established rules to minimize operational waste
- The management system has established a monitoring and enforcement program for operational waste and has achieved a significant trend in reduction of such waste

80 Scoring Guidepost

- The management system has established rules to minimize operational waste, including monitoring and enforcement

60 Scoring Guidepost

- Major participants in the fishery lack internal programs or controls to minimize operational waste

SCORE 85

From a regulatory standpoint, seafood processors - - both shoreside and at-sea processors - - are subject to discharge rules and regulations issued by the U.S. Environmental Protection Agency (EPA) and the State of Alaska's Division of Environmental Conservation (DEC). Those rules and regulations are implemented through the issuance of National Pollutant Discharge Elimination System (NPDES) permits which limit the nature of seafood processing waste and which require discharges of such waste to be ground into particles not more than

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with other existing approaches for the conservation of marine resources." Testimony of Dr. William T. Hogarth, Assistant Administrator for Fisheries, National Oceanic and Atmospheric Administration, at the Regional Meeting of the U.S. Commission on Ocean Policy, Marine Protected Area Policy Panel, Los Angeles, California April 19, 2002; http://www.nmfs.noaa.gov/testimony/Hogarth_OC_LA_final.htm

.5" in diameter prior to discharge. In addition, the large shoreside processing plants that service the Bering Sea/Aleutian Island and Western GOA pollock fisheries are subject to maximum total daily load (MTDL) limits on the amount of effluents they can discharge into any closed bodies of water proximate to the plants. Virtually all of the shoreside processing plants that process GOA pollock have dedicated meal plants to treat processing waste.

The Improved Retention/Improved Utilization (IR/IU) regulations (Amendment 49), implemented in 1998, now require all fishing vessels and processors to retain and process 100% of the pollock and cod that they catch, and to utilize that fish in the production of one or more primary and secondary products. These requirements further reduced any operational waste associated with the harvesting and processing of pollock in the BSAI and GOA fisheries.

In the view of the evaluation team, the management system has imposed significant restrictions on the fisheries to minimize operational waste, resulting in very efficient fisheries throughout the region.

Indicator 4.2 The management system provides for compliance *[Relates to MSC Criteria 3.11, 3.16]*

Elements considered in scoring include:

- Contains procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that management system controls are not violated and appropriate corrective actions are taken
- Actual adherence to procedures

100 Scoring Guidepost

- The management system has established a comprehensive compliance and enforcement system
- The management system has demonstrated a consistent ability to enforce applicable rules, including a independently verified system for validation of reported results
- The fishery operates with no significant patterns of evasion or non-compliance

80 Scoring Guidepost

- The management system has established a comprehensive compliance and enforcement system
- There is not a record of consistent violations in the fishery
- There is a record of consistent enforcement and prosecution of violations in the fishery

60 Scoring Guidepost

-

- There is a record of regular violations in the fishery regardless of an existing enforcement system
- Penalties for violations of rules are insignificant in terms of deterrence value

SCORE 90

The team was presented with no evidence to suggest that enforcement and compliance were anything less than excellent throughout the fisheries.

The GOA pollock fishery is subject to multiple layers of monitoring, control and compliance assurance mechanisms. The U.S. Coast Guard conducts surveillance and enforcement, using aircraft and vessels to monitor activities on the fishing grounds. NMFS also has an effective enforcement division, and NMFS enforcement agents often accompany the Coast Guard on its fisheries enforcement mission. At-sea enforcement includes boarding of vessels to review logbooks, vessel inspections and cargo inspections. The Magnuson-Stevens Fishery Conservation and Management Act, the nation's principal fisheries law, provides for civil and criminal penalties for violations of fisheries laws and regulations.

Compliance and monitoring is enhanced through a comprehensive federal fishery observer program. All catcher vessels over 125 feet in length carry one observer and vessels greater than 60 feet in length and not longer than 125 feet carry an observer 30 percent of the time. Observers file reports electronically. Following a trip, observers are debriefed by NMFS officials and are routinely questioned about issues relating to fishing industry compliance with fishery management regulations. In the case of shoreside processing for the GOA fishery, a shoreside processor that processes 1,000 MT or more in round-weight equivalent of groundfish during a calendar month is required to have an observer present at the facility each day it receives or processes groundfish during that month.

The North Pacific Council receives a report on enforcement actions at each meeting. In addition, a Coast Guard representative serves as a non-voting member of the Council and advises the Council on enforcement issues related to proposed fishery management actions.

When NMFS or the Coast Guard detect a possible fishery violation a Notice of Violation is issued and the matter is referred to NOAA's Office of General Counsel, which works with NMFS enforcement to determine whether or not sufficient evidence exists to warrant prosecution. There are substantial penalties available under the Magnuson-Stevens Act, including a $100,000 fine for each violation as well as forfeiture of the catch.

Indicator 4.3 The management system provides for monitoring *[Relates to MSC Criterion 3.10, 3.11, 3.17]*

Elements considered in scoring include:

- Fishery includes a monitoring program
- Monitoring procedures are followed
- Monitoring results are useful and used

100 Scoring Guidepost

- The management system has established a comprehensive monitoring program
- The management system has demonstrated a consistent ability to monitor all relevant aspects of the fishery and employs an independently verified system for validation of reported results
- The fishery operates with no significant “blind spots”.

80 Scoring Guidepost

- The management system has established a comprehensive monitoring program
- The monitoring programs established in the fishery have been subject to outside review and comment
- The results of monitoring efforts are compiled, analyzed, and disseminated to fishery managers such that management and research efforts can be informed as to needed improvements in a timely manner

60 Scoring Guidepost

- Monitoring results are poorly integrated with harvest management actions

SCORE 85

As noted above, the pollock fishery is carefully monitored through a comprehensive federal fishery observer program as well as extensive record keeping and logbook reporting. Observer data is used to monitor and enforce catch levels and as fishery dependent data.

This observer program is the only one of its kind in any U.S. fishery. But improvements could be made related to coverage and the hiring process.

Under North Pacific Council requirements, vessels obtain observers directly from private observer companies. While the NMFS certifies observers that have passed training, it has no role in selecting or distributing observers to vessels. Direct contracting of observers by vessels presents an opportunity for vessels and observer companies to select observers “satisfactory” to a vessel. In the extreme, this could result in observers benefiting the vessels by not performing all duties with due diligence.

Observer coverage of vessels in the 30 percent coverage category is not random at the vessel level. An independent review carried out in 1999/2000 indicated that this has the potential to introduce unknown bias into the dataset.[82] The review cited a high likelihood of differences in vessel behavior between observed and non-observed vessel days, both in terms of fishing patterns and compliance with management measures.

[82] MRAG Americas, Independent Review of the North Pacific Groundfish Observer Program (2000).

In addition, while the 30 percent coverage level may provide sufficient coverage for routine sampling, it may not provide enough spatial and/or temporal coverage for special scientific programs (e.g., otoliths, stomach contents sampling for ecosystem studies).

The independent review recommended the development of a mechanism under which the NMFS has direct control over coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage. To date, this recommendation has not been implemented.

Overall, as noted above, the fishery benefits from extensive, useful, and reliable monitoring. The score for the Gulf of Alaska reflects the lower level of monitoring by observers in that fishery. The team noted with some concern that, while the management system had commissioned independent reviews of the monitoring program, the major recommendations from those reviews were yet to be enacted.

SCS Criterion 5

The performance of the management system is regularly and candidly evaluated and adapted as needed to improve

Indicator 5.1 The management system provides for internal assessment and review *[Relates to MSC Criterion 3.3]*

Elements considered in scoring:

Frequency
Candor (accuracy and precision)
Transparency
Participation

100 Scoring Guidepost

- The management system has an internal, continuing, objective system for evaluation of management performance
- The criteria for and results of the on-going evaluation of management performance are made public and reflect input from all interested participants and stakeholders
- The management system shows a consistent pattern of seeking and using the results of the on-going evaluation of management performance

80 Scoring Guidepost

- The management system has a continuing, objective, open system for evaluation of management performance that includes input from interested participants and stakeholders with respect to criteria and results

- The criteria for and results of the on-going evaluation of management performance are made public.

60 Scoring Guidepost

- The management system does not have a regular program to evaluate management performance

SCORE 75

The applicant provided the evaluation team with information that there are numerous examples of NMFS and the Council conducting internal assessments of the procedures and analyses employed in the management of the GOA pollock fishery as well as all other GOA and BS/AI groundfish fisheries. Some of these assessments range from Plan Team peer reviews of stock analysis to a recent National Academy of Sciences review.

The conservation stakeholders argue, in essence, that NMFS does not provide for adequate internal assessment and review and, as a result, fails to employ adaptive management in the groundfish fisheries. The groups contend that, "In order to learn from past management actions and adapt management programs accordingly, NMFS should have been taking a hard look at the direct, indirect and cumulative effects of management decisions as represented in the many amendments to the current FMPs. There are a number of questions that NMFS should have been answering over the life of the current FMPs in order to make the most informed proactive management choices. NMFS has failed to address the following questions in whole or part:

1. How do the current FMPs enable NMFS to address the combined and cumulative impacts of management actions as reflected in the many amendments to the FMPs since the first EISs were prepared?

2. How effective have the successive FMP amendments been at addressing identified problems? What unintended consequences have issued from major regulatory initiatives, and how successfully have subsequent amendments mitigated them? Why were some measures more effective than others?

3. To what extent do the amendments to the FMPs reflect a precautionary approach? To what extent are they reactions to multiple crises rather than means of avoiding them?

4. To what extent are management decisions truly science-based versus allocative or political? In other words, what role does political influence play in the shaping of policy and management decisions, as expressed in the FMPs?

5. How has the ad hoc or piecemeal (incremental) approach represented in the many amendments and amendments to amendments to the FMPs resulted in a coherent policy framework for achieving ecosystem-based management or any other management goal?

The evaluation team was presented with considerable evidence that the fishery management system undertakes significant internal reviews of certain key technical and scientific issues, resulting in useful improvements to the system over time. It appears that most of the changes proposed by the Council appear to be driven largely by external pressures associated with meeting the needs of fishery participants, rather than by information derived from routine internal assessments conducted to determine whether the fishery is meeting its stated goals and objectives (Bernstein et al., 2002).

The score would have been higher but for the fact that the team received no evidence that the management system had conducted an appropriate internal evaluation of the management problems that have arisen, and in many respects defined, the management process over the past several years. Indeed, the struggle to define the scope and orientation of the PSEIS suggests just how unsure NMFS and the Council and some stakeholders had become as to the relationship between purposes of the overall management program and its results.

At issue is whether NMFS, as the stewardship agency for public marine resources in the North Pacific, is capable of recognizing and understanding the consequences of the federal action it is undertaking and learning from the past in order to avoid repeating mistakes unnecessarily and to adapt management programs pursuant to a consistent and coherent policy framework.

Condition

To improve the deficiencies in performance for this indicator, the fishery must demonstrate the existence of a periodic, candid and authoritative internal review process for pollock fishery management procedures and outcomes and publish the results of such a review process. The initial review must address the issues expressed and implied by the five questions posed above. A subsequent review must be performed not later than two years following the initial review. The managers may wish to consult with the U.S. Institute for Environmental Conflict Resolution or other entities with expertise in dispute resolution in the context of natural resource management. The terms of this condition must be fulfilled within one year after final approval of this assessment report.

<u>Indicator</u> 5.2 The management system provides for external assessment and review ***[Relates to MSC Criterion 3.2, 3.3]***

Elements considered in scoring:

- Frequency
- Candor (accuracy and precision)
- Transparency
- Participation

100 Scoring Guidepost

- The management system provides for independent, expert review of all significant aspects of management performance on a regular and continuing basis
- The criteria for evaluation of management performance are set outside the management system
- The results of the independent review are made public
- The management system shows a consistent pattern of seeking and using the results of the independent evaluation of management performance

80 Scoring Guidepost

- The management system provides for independent, expert review of all significant aspects of management performance
- The criteria for evaluation of management performance are set outside the management system
- The results of any independent review are made public

60 Scoring Guidepost

- Significant aspects of the management system are not open to outside view or evaluation

SCORE 90

There is extensive evidence of creditable, incisive external review of the management system's performance. This is particularly so with respect to scientific matters and monitoring practices. The evaluation team notes with approval that the National Research Council of the National Academy of Sciences has conducted reviews of this fishery and of general issues that are directly relevant to the fishery. The NPFMC has commissioned several independent reviews of particular aspects of the management system, and recently convened an international panel to evaluate the tier system used in setting harvest limits. The General Accounting Office, a financial and program-auditing arm of the United States Congress, also has reviewed the fishery. Congressional committees have conducted oversight and legislative hearings regarding the fishery, and the Magnuson-Stevens Act itself is subject to periodic reauthorization and amendment in light of, among other things, these fisheries. The federal courts, too, have performed highly independent evaluations of the fisheries and are likely to continue to do so.

The team notes that external review of the management system is not a substitute for the internal review discussed under Indicator 5.1. Both perspectives are important and legitimate and, together, should complement one another and provide a reliable basis for consideration of measures to improve the system's performance. The score for this indicator would have been higher if the management system had a formal, routine process for external performance review.

<u>Indicator</u> 5.3 The management system includes guidelines for responding to assessment outcomes *[Relates to MSC Criteria 3.3, 3.7]*

Elements considered in scoring:

- Nature of the guidelines
- Timing, scope of response to assessment outcomes (actual relevance of process)

100 Scoring Guidepost

- The management system has established comprehensive, objective standards or triggers for responding to internal and external assessments of management performance
- The management system has demonstrated a consistent pattern of responding to the results of internal and external assessments of management performance
- The management system has not demonstrated a consistent pattern of disregarding significant recommendations for improvement developed through internal or external assessments of management performance

80 Scoring Guidepost

- The management system has established objective guidelines for responding to internal and external assessments of management performance
- The management system shows evidence of improved performance based on the results of internal and external assessments of management performance

60 Scoring Guidepost

- The management system responds in an arbitrary fashion to assessments of management performance

SCORE 70

The evaluation team was provided with a substantial body of information that NMFS and Council are conscientious in responding to internal and external reviews and implementing changes in practices and procedures. The record is replete with examples of management alternatives, and in fact whole amendments, added, deleted or modified based on changing conditions, new information or public input. However, the evaluation team was presented with no evidence that the management system has established objective guidelines for responding to internal or external evaluations.

Moreover, the management system shows very little evidence of responding to the more searching evaluations reviewed by the team. This is not to say that the system has not changed over the years; it has and largely for the better. But the team was not able to identify a clear relationship between the many reviews done of the fisheries and the performance of the management system. For example, the system has been drawn into litigation repeatedly on essentially the same issues. The system has not responded to the MRAG review of the observer program. And, as noted elsewhere in this report, the team was troubled to find that the management system shows some evidence of what might be called "peer shopping," where a review that reaches conclusions disfavored by certain stakeholders is set aside and other reviews commissioned until more welcome results are reported. This pattern appears quite evident in the series of studies and reports commissioned in the wake of the release of the November 2000 BiOp and in NPFMC's current consideration of retaining independent legal counsel, rather than relying on the NOAA General Counsel's office. The team does not have an opinion on which one in a series of reviews ought to be considered the best basis for action, but the process of picking and choosing does not build confidence in the integrity of the management system.

Condition

To improve the deficiencies in performance for this indicator, the fishery must demonstrate the use of objective criteria in the system required under Indicator 5.1 - the internal evaluation of the pollock fishery management system's performance.

<u>Indicator</u> 5.4 The management system identifies research needs and directs appropriate funding and other resources *[Relates to MSC Criteria 3.3, 3.7*]

Elements considered in scoring:

- Adequacy of funding
- Predictability of funding
- Prioritization/allocation of funding

100 Scoring Guidepost

- Funding for research is adequate to address all significant knowledge gaps
- Funding is adjusted in a timely and appropriate manner to serve changing research priorities
- Funding is predictable over a long-enough time scale to allow research planning appropriate to long-term research needs

80 Scoring Guidepost

- Funding for research is adequate to address major gaps in knowledge
- Funding is adjusted to meet requirements of newly identified research priorities
- Funding is predictable over long-enough time scale to allow continuity of all major stock assessment and ecological interactions research programs

60 Scoring Guidepost

- Research funding supports only sporadic investigations, allowing incomplete coverage of topics, resulting in considerable uncertainty as to the fishery and its impacts

SCORE 85

Research funding appears to be adequate at present, and impressed the team as well allocated among a large number of important issues.[83] As the team has noted elsewhere, it is of some concern that today's ample funding for certain aspects of research associated with ecosystem impacts and ESA is likely to return to historic average levels in a short period of time. The team notes that no evidence was presented to show that the management system has developed a strategic long-term research plan as contemplated by this indicator. There clearly are annual reviews that identify research priorities and develop plans to spend available research funds. The issue is whether there is a long-term strategy for research associated with groundfish fisheries in the GOA, and how this strategy if followed using the year-to-year research reviews and setting of annual priorities.

8 TRACKING, TRACING FISH AND FISH PRODUCTS

Under Section 2, subsection 2.5, a brief description is given of the processing and transshipment activities that generally take place in this fishery. MSC Chain of Custody requirements were only checked as far as the landing of fish on board legally licensed fishing vessels and found to be compliant with MSC requirements. Further chain of custody were not conducted for any of the fish moving from boat deck into the processing segment of the fishery either onboard ships or at shoreside processing plants. It is highly recommended that any Chain of Custody certificates issued for product originating from this fishery also examine and verify the captain's logbook data, the required reporting data on catch from the fishery, and observer reports as part of ensuring that the fish products carrying the MSC logo are properly verified.

9 PEER REVIEW AND PUBLIC COMMENT

Following client agreement on the draft report, a report was issued for peer review and public comment. The peer reviewers selected were Dr. Susan Hanna and Dr. John Pope. Both peer reviewers have been involved for numerous years in fisheries management and research. The peer review reports produced are appended to this final report (Appendix 4 and Appendix 5).

[83] NOAA Fisheries' budget request for the coming year is detailed at www.publicaffairs.noaa.gov/budget2004/images/fy2004bluebook.pdf. Page 98 shows that NOAA is requesting about half the amount of funding for Steller sea lion research as was appropriated in FY 2001 and 2002.

Both reviewers highlighted areas in the report where clarifications were necessary and useful. The questions and/or requests for clarification have been taken into account in drafting this final report.

A request for public comments was also put forth to meet the requirements under the MSC program. Comments were received from the MSC and a number of stakeholders and are appended to this report as Appendix 6. Again, comments from stakeholders were seen as very useful and modification to this final report made where deemed appropriate.

10 CERTIFICATION RECOMMENDATION AND PERFORMANCE SCORES

It is the assessment team's consensus judgment that the management of the United States Gulf of Alaska (GOA) pollock fishery complies overall with the MSC Principles and Criteria.

The fishery achieved a normalized score of 80 or above on each of the three MSC Principles independently (Principle 1 – 82.76, Principle 2 – 80.39, and Principle 3 – 83.01). Although the evaluation team found the fishery in overall compliance (a normalized score of 80 on each MSC Principle), it also found the fishery's performance on a number of specific indicators to be below the established compliance mark (an unweighted score of 80 for a single indicator). In these specific cases, the MSC requires that the Certification Body set 'Conditions for Continued Certification' that when met bring the level of compliance for the select indicator up to the 80-level score. Table 5 below shows the overall results of the evaluation in terms of Principle 1, 2, and 3.

It is important to remember that Principle 3 performance indicators were developed in a different form and numerical sequence from the actual criteria and indicators under MSC Principle 3. Since the certification body is not supposed to change the MSC criteria, the performance measures were linked back to the specific MSC criteria as provided in Table 4 shown below. The fishery was then scored using the MSC Criteria and their associated indicators as shown in Table 5, which shows the actual scores and weights assigned to each of the indicators in the AHP program.

Table 4. Linkages between Developed Performance Indicators and MSC Criteria under MSC Principle 3.

MSC Principle 3		
MSC Criterion 1	**Indicator 1.1**	**SCS Indicator 2.1**
MSC Criterion 2	**Indicator 2.1**	**SCS Indicator 1.1**
	Indicator 2.2	**SCS Indicator 1.2**
	Indicator 2.3	**SCS Indicator 1.3**
	Indicator 2.4	**SCS Indicator 3.1**
	Indicator 2.5	**SCS Indicator 3.2**
	Indicator 2.6	**SCS Indicator 3.3**
	Indicator 2.7	**SCS Indicator 3.4**
	Indicator 2.8	**SCS Indicator 3.5**
	Indicator 2.9	**SCS Indicator 5.2**
MSC Criterion 3	**Indicator 3.1**	**SCS Indicator 5.1**
	Indicator 3.2	**SCS Indicator 5.2**
	Indicator 3.3	**SCS Indicator 5.3**
	Indicator 3.4	**SCS Indicator 5.4**
MSC Criterion 4	**Indicator 4.1**	**SCS Indicator 1.3**
	Indicator 4.2	**SCS Indicator 2.3**
MSC Criterion 5	**Indicator 5.1**	**SCS Indicator 3.4**
MSC Criterion 6	**Indicator 6.1**	**SCS Indicator 1.3**
MSC Criterion 7	**Indicator 7.1**	**SCS Indicator 1.1**
	Indicator 7.2	**SCS Indicator 1.2**
	Indicator 7.3	**SCS Indicator 1.3**
	Indicator 7.4	**SCS Indicator 5.3**
	Indicator 7.5	**SCS Indicator 5.4**
MSC Criterion 8	**Indicator 8.1**	**SCS Indicator 1.4.1**
MSC Criterion 9	**Indicator 9.1**	**SCS Criterion 1.1**

	Indicator 9.2	**SCS Criterion 1.2**
MSC Criterion 10	**Indicator 10.1**	**SCS Criterion 1.1**
	Indicator 10.2	**SCS Criterion 1.2**
MSC Criterion 11	**Indicator 11.1**	**SCS Criterion 4.2**
	Indicator 11.2	**SCS Criterion 4.3**
MSC Criterion 12	**Indicator 12.1**	**SCS Criterion 4.1.2**
MSC Criterion 13	**Indicator 13.1**	**SCS Criterion 4.1.3**
MSC Criterion 14	**Indicator 14.1**	**SCS Criterion 4.1.4**
MSC Criterion 15	**Indicator 15.1**	**SCS Criterion 4.1.9**
MSC Criterion 16	**Indicator 16.1**	**SCS Criterion 2.2**
	Indicator 16.2	**SCS Criterion 4.2**
MSC Criterion 17	**Indicator 17.1**	**SCS Criterion 4.1.3**
	Indicator 17.2	**SCS Criterion 4.3**

Table 5. Scoring assigned to fishery using AHP.

Principles, Criteria, Subcriteria, and Indicators					AHP Assigned Score	AHP Assigned Weight
MSC Principle 1					82.76	.333
MSC Criterion 1						
	SC 1.1					.750
		SSC 1.1.1				.600
			Indicator 1.1.1.1		95	.110
			Indicator 1.1.1.2		85	.110
			Indicator 1.1.1.3		85	.110
			Indicator 1.1.1.4		85	.110
			Indicator 1.1.1.5		75	.211
			Indicator 1.1.1.6		95	.348
		SSC 1.1.2				.400
			Indicator 1.1.2.1		70	.333
			Indicator 1.1.2.2		80	.333
			SSSC 1.1.2.3			.333
				Indicator 1.1.2.3.1	85	.154
				Indicator 1.1.2.3.2	80	.154
				Indicator 1.1.2.3.3	79	.154
				SSSSC 1.1.2.3.4		.302
				Indicator 1.1.2.3.4.1	100	.099
				Indicator 1.1.2.3.4.2	80	.252
				Indicator 1.1.2.3.4.3	85	.143
				Indicator 1.1.2.3.4.4	90	.170
				Indicator 1.1.2.3.4.5	90	.207
				Indicator 1.1.2.3.4.6	80	.129
				SSSC 1.1.2.3.5		.236

					Indicator 1.1.2.3.5.1	**85**	**.571**
					Indicator 1.1.2.3.5.2	**90**	**.286**
					Indicator 1.1.2.3.5.3	**100**	**.143**
	SC 1.2						**.250**
		Indicator 1.2.1				**80**	**.250**
		Indicator 1.2.2				**95**	**.250**
		Indicator 1.2.3				**90**	**.500**
MSC Criterion 2							**.200**
	SC 2.1	**Indicator 2.1.1**				**75**	**.500**
		SSC 2.1.2	**Indicator 2.1.2.1**			**80**	**.500**
MSC Criterion 3							**.200**
		Indicator 3.1.1				**85**	**.250**
		Indicator 3.1.2				**100**	**.250**
		Indicator 3.1.3				**70**	**.500**
MSC Principle 2						**80.39**	**.333**
MSC Criterion 1							**.459**
	Indicator 1.1					**75**	**.545**
	SC 1.2						**.182**
		Indicator 1.2.1				**79**	**.208**
		Indicator 1.2.2				**90**	**.208**
		Indicator 1.2.3				**79**	**.292**

		Indicator 1.2.4	**95**	**.292**
	SC 1.3			**.273**
		Indicator 1.3.1	**95**	**.250**
		Indicator 1.3.2	**92**	**.25**
		Indicator 1.3.3	**75**	**.500**
MSC Criterion 2				**.270**
	Indicator 2.1		**79**	**.300**
	SC 2.2			**.300**
		Indicator 2.2.1	**75**	**.667**
		Indicator 2.2.2	**95**	**.333**
	SC 2.3			**.200**
		Indicator 2.3.1	**79**	**.250**
		Indicator 2.3.2	**95**	**.250**
		Indicator 2.3.3	**79**	**.250**
		Indicator 2.3.4	**95**	**.250**
	SC 2.4			**.200**
		Indicator 2.4.1	**80**	**.200**
		Indicator 2.4.2	**90**	**.333**
		Indicator 2.4.3	**90**	**.333**
MSC Criterion 3				**.270**
	Indicator 3.1		**80**	**.333**

	Indicator 3.2	**79**	**.333**
	Indicator 3.3	**79**	**.333**
MSC Principle 3		**83.01**	**.333**
MSC Criterion 1	**Indicator 1.1**	**100**	**.046**
MSC Criterion 2			**.092**
	Indicator 2.1	**95**	**.159**
	Indicator 2.2	**75**	**.159**
	Indicator 2.3	**80**	**.040**
	Indicator 2.4	**78**	**.080**
	Indicator 2.5	**80**	**.080**
	Indicator 2.6	**80**	**.121**
	Indicator 2.7	**80**	**.080**
	Indicator 2.8	**75**	**.121**
	Indicator 2.9	**90**	**.159**
MSC Criterion 3			**.092**
	Indicator 3.1	**75**	**.300**
	Indicator 3.2	**90**	**.300**
	Indicator 3.3	**70**	**.300**
	Indicator 3.4	**85**	**.100**
MSC Criterion 4			**.046**
	Indicator 4.1.1	**80**	**.500**
	Indicator 4.1.2	**90**	**.500**
MSC Criterion 5	**Indicator 5.1**	**80**	**.046**
MSC Criterion 6	**Indicator 6.1**	**80**	**.023**
MSC			**.070**

Criterion 7			
	Indicator 7.1	**95**	**.182**
	Indicator 7.2	**75**	**.182**
	Indicator 7.3	**80**	**.091**
	Indicator 7.4	**70**	**.364**
	Indicator 7.5	**85**	**.182**
MSC Criterion 8	**Indicator 8.1**	**100**	**.070**
MSC Criterion 9			**.070**
	Indicator 9.1	**95**	**.500**
	Indicator 9.2	**75**	**.500**
MSC Criterion 10			**.092**
	Indicator 10.1	**95**	**.111**
	Indicator 10.2	**75**	**.111**
	Indicator 10.3	**70**	**.111**
	Indicator 10.4	**80**	**.111**
	Indicator 10.5	**80**	**.111**
	Indicator 10.6	**75**	**.111**
	Indicator 10.7	**90**	**.111**
	Indicator 10.8	**79**	**.111**
	Indicator 10.9	**85**	**.111**
MSC Criterion 11			**.070**
	Indicator 11.1	**90**	**.500**
	Indicator 11.2	**85**	**.500**
MSC Criterion 12	**Indicator 12**	**90**	**.070**
MSC Criterion 13	**Indicator 13**	**80**	**.070**

MSC Criterion 14	**Indicator 14**	**90**	**.030**
MSC Criterion 15	**Indicator 15**	**85**	**.030**
MSC Criterion 16			**.041**
	Indicator 16.1	**62**	**.667**
	Indicator 16.2	**90**	**.333**
MSC Criterion 17			**.041**
	Indicator 17.1	**80**	**.500**
	Indicator 17.2	**85**	**.500**

11 MEETING CONDITIONS FOR CONTINUED CERTIFICATION

To be awarded an MSC certificate for the fishery, the applicants must agree in written contract to develop an action plan for meeting the required 'Conditions'; a plan that must provide specific information on what actions will be taken, who will take the actions, and when the actions will be completed. The Action Plan must be approved by SCS as the certification body of record. The applicant must also agree in a written contract to be financially and technically responsible for surveillance visits by an MSC accredited certification body, which would occur at a minimum of once a year, or more often at the discretion of the certification body (based on the applicant's action plan or by previous findings by the certification body from annual surveillance audits or other sources of information). The contract must be in place prior to certification being awarded. Surveillance audits will be comprised in general of (1) checking on compliance with the agreed action plan for meeting pre-specified 'Conditions', and (2) sets of selected questions that allow the certifier to determine whether the fishery is being maintained at a level of performance similar to or better than the performance recognized during the initial assessment.

We are mindful that even though the applicant (APA) takes the necessary steps to meet conditions, APA's capacity to affect the management system may be limited. In the case where the managers or other sectors of the fishery are not able to cooperate with APA, it will be APA's responsibility to find other ways to effectively meet the conditions. The certification body will be mindful of the difficulties that may accrue as a result of different interests in the fishery when measuring performance against the required conditions.

11.1 General Conditions for Continued Certification

The general 'Conditions' set for the GOA fishery are:

- At Sea Processors Association must recognize that MSC standards require regular monitoring inspections at least once a year, focusing on compliance with the 'Conditions' set forth in this report (as outlined below) and continued conformity with the standards of certification.
- At Sea Processors must agree by contract to be responsible financially and technically for all surveillance visits set and required by the certification body of record (SCS), which would occur at a minimum of once a year or more often at the discretion of the certification body based on the applicant's action plan or by previous findings by SCS. Surveillance audits will be comprised in general of (1) checking on compliance with the agreed action plan for meeting pre-specified 'Conditions', and (2) sets of selected questions that allow the certifier to determine whether the fishery is being maintained at a level of performance similar to or better than the performance recognized during the initial assessment.
- At Sea Processors must recognize that MSC standards require a full re-evaluation for certification (as opposed to yearly monitoring for update purposes) every five years.
- Prior to receiving final certification, At Sea Processors Association shall develop an 'Action Plan for Meeting the Condition for Continued Certification' and have it approved by SCS. The action plan for meeting the required 'Conditions' must provide specific information on what actions will be taken, who will take the actions, and when the actions will be completed. The Action Plan must be approved by SCS as the certification body of record.

11.2 Specific Conditions for Continued Certification

In addition to the general requirements outlined above, At Sea Processors Association must also agree in a written contract with an accredited MSC certification body to meet the specific conditions as described in Section 7 and summarized below (within the agreed timelines that will be agreed in the ' Action Plan for Meeting the Condition for Continued Certification' to be approved by SCS).

MSC Principle 1

Indicator 1.1.1.5: The harvest strategy can be shown to be precautionary.

Condition

To improve the deficiencies in performance for this indicator, SCS requires that formal evaluation and testing of the robustness of current and any proposed new harvest strategies used to manage GOA pollock be undertaken, using methods similar to those recommended by Goodman et al. (2002). The SCS evaluation team requires that any plans to correct this deficiency lay out a step-wise plan with timelines such that at least three stages of work would be available for evaluation:

1. Prepare detailed specifications for the evaluation.
2. Undertake the evaluations.
3. Modify harvest strategies as appropriate from the results of the evaluations.

Notes related to tasks:

Designing and implementing a management strategy evaluation study is a complex task, and the SCS evaluation team does not seek to prescribe precisely how it should be done. Nevertheless, the SCS team sees this condition as the key one that will help overcome most of their concerns with regard to Principle 1, and wishes to maintain an active involvement in monitoring progress in meeting the condition. The SCS team also considers it prudent that there be suitable opportunity for input from key stakeholders in the fishery. (Where there is substantial disagreement between stakeholders, the SCS team will be the final arbiters). Whoever is contracted to undertake the task would do well to consult and be guided by the fairly detailed proposal in sections 3.10 and 3.11 of Goodman et al (2002) as this will be used by the SCS team as a benchmark, noting that those specifications are for testing generic NPFMC harvest strategies, and will need to be adapted for the specific circumstances of GOA Pollock.

In general, task 1 will involve specifying the set of performance measures against which the harvest strategies will be judged, the set of robustness tests to be undertaken, the detailed specifications of the operating models to be used, and the range of harvest strategies to be evaluated. The latter should include monitoring and assessment models as well as harvest control laws, noting that some simplification of detailed assessment models may be required for computational efficiency in testing harvest strategies. The robustness tests should include, at a minimum, the impacts of environmentally driven changes in productivity and the impacts of episodic recruitment. They should deal explicitly with key issues and uncertainties identified elsewhere in this report and cross referenced to this condition. Consideration should be given to including operating models that go beyond single species dynamics, where these are available or can be developed in suitable timeframes, and performance measures should include consideration of impacts on predators. The detailed specifications and proposal for work should be presented and discussed at an open workshop as soon as practical following certification. The proposal should specify who will undertake the work, the timelines involved, and the resources allocated to the task. At least one member of the evaluation team should attend the workshop.

The work program is to be agreed by the SCS evaluation team and the group undertaking the evaluations. The timelines can not be pre-specified, but will depend on the nature and complexity of the agreed work program. To maintain certification, progress on agreed tasks will be checked during surveillance visits at the specified time frames, or at the annual audits required by MSC if the time frames coincide.

The results of the evaluations will be made available to NPFMC, and will be presented at a second open workshop. Appropriate responses to the evaluations, including suggested changes to current harvest strategies, will be discussed and agreed in principle. Uptake of changes will follow through the due process of NPFMC decision making.

Indicator 1.1.2.1: Current stock sizes are assessed to be above appropriate limit reference points.

Condition

To improve the deficiencies in performance for this indicator, SCS requires that:

1. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation. Specifically, the testing of alternative harvest strategies should evaluate whether the criterion that the stock should remain above the static version of $B_{20\%}$ provides sufficient protection for predators of Pollock.
2. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the relative impacts of fishing on recruitment variability and stock abundance.
3. The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).

Indicator 1.1.2.3.3: Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.

Condition

To improve the deficiencies in performance for this indicator, SCS requires that:

1. Consideration be given by the SSC to raising GOA pollock to Tier 1 so that the harvest strategy is more responsive to uncertainties in the assessment.
2. The Bayesian analyses already undertaken for GOA pollock be used to better present the uncertainties in the assessment, including confidence intervals on stock biomass trajectories, and probabilities that biomasses and exploitation rates exceed target and limit reference points.

Indicator 2.1.1: Rules for setting TACs at low stock sizes promote recovery within reasonable time frames.

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the same conditions that are required under indicator 1.1.1.5. No additional work would be required at this time.

Indicator 3.1.3: Information from stock assessment does not indicate problems with reproductive capacity (spawning stock and recruitment).

Condition

The condition for this indicator is the same as for indicator 1.1.2.1. No other conditions are required at this stage.

MSC PRINCIPLE 2

Indicator 1.1. There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.

Condition

To improve the deficiencies in performance for this indicator, the fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries.

Fisheries science is still developing methodologies for introducing environmental parameters into fisheries models and the state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further such development, and so some time is required to allow the necessary developments (see below).

The plan must show how the authors of the 'Ecosystem Considerations' chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures.

Indicator 1.2.1. Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for

protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.

Condition

To improve the deficiencies in performance for this indicator, the fishery must improve assessments of impacts on habitats as follows:

1. Provide the certification body with information on ongoing research projects to determine the impact of pollock fishing, if any, on SSL critical habitat with particular emphasis on the effects of fishing, if any, on foraging sea lions.
2. Meet Condition 3.1 – thus provide a thorough written review of gear loss from pollock fishers and its impacts on habitats.
3. Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds. We require that the certification body be provided a summary of the current state of knowledge on the identified issue areas of concern and that targeted, clearly defined research programs be undertaken, if necessary, after consultation between the certification body and the fishery based on the findings of the written reviews.

Indicator 1.2.3. Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.

Condition

To improve the deficiencies in performance for this indicator, research must be implemented to describe:

- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the regional scale related to stock size and stock geographical distribution;
- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling.
- Plans for these research projects will be sent to the SCS team for review, and then initiated no later than the following calendar year. Where research leads to new information relevant to management, appropriate changes in management will be required.

Indicator 1.3.3. Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent

explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.

Condition

To improve the deficiencies in performance for this indicator, the fishery must provide the SCS team with information on ecosystem modeling being carried out to investigate whether increases in jellyfish or Arrowtooth flounder are likely to be due to reductions in pollock biomass consequent on fishing.

Concerns regarding the relationship between the pollock fisheries and SSL are dealt with under Indicator 2.3.1.

Indicator 2.1. The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.

Condition

To improve the deficiencies in performance for this indicator, the fishery must:

- Adjust management as described in the Conditions under Indicator 1.1.
- Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.

Indicator 2.2.1. The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act

Condition

With regard to Steller sea lions (SSLs), current management measures regulating fishing in SSL critical habitat were developed, in large part, based on satellite telemetry data collected to define important SSL foraging areas. To improve the deficiencies in performance for this indicator, the team calls for rigorous peer review of the telemetry data analysis given the significant role of the telemetry data in setting the regulatory regime. Given these considerations, the evaluation team sets for the following conditions:

- The analysis of the satellite telemetry data and results used to justify the 2001 BiOp should be subject to external peer review and the results of such review shall be available to the certifier within 6 months of issuance of the certificate for the GOA fishery. NMFS should submit the telemetry data analysis to the Center of Independent Experts (CIE). The University of Miami's CIE administers a review process, drawing from a formal pool of qualified scientific experts, ensuring the selection of a panel free from the influence of either NMFS or other groups with a vested interest in the review's findings. It is very important that the panel should contain 2 or members with expertise in the analysis of PTT data from marine vertebrates.

- The management system should consider the input received from the CIE review and act appropriately.

Indicator 2.3.1. Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.

Condition

To improve the deficiencies in performance for this indicator, the fishery must design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on SSL behavior, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002) recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. We support the goals and objectives of the NRC's prescribed action, but appreciate that it would be inappropriate to suggest increasing pollock fishing intensity to levels that increase jeopardy (in the legal sense) to SSL populations and that there are complex scientific and legal issues involved. Therefore, it will be necessary to design this experiment in such a way that comparison can be made between areas where fishing intensity is reduced with areas where it is maintained at levels comparable to those in the recent past (but perhaps within this limit still increased by as much as the decrease in harvest lost to industry from reduced fishing areas). The hypothesis to test would then be that SSL numbers or productivity in reduced fishing areas would show a positive deviation relative to values in fished areas, and the null hypothesis that performance of SSL would be no different between areas. Such an experiment should be underway no later than 2006.

Indicator 2.3.3. Research is carried out to allow impacts of the fishery on endangered, threatened, protected and icon species to be identified and measured.

Condition

Same as in Indicator 2.3.1.

Indicator 3.2. Changes in management have been implemented in order to recover affected communities of animals, habitats, or populations of impacted species that are believed to have been depleted by previous actions of this fishery.

Condition

To improve the deficiencies in performance for this indicator, the fishery must modify management of the fishery to address concerns identified from research required under conditions attached to Indicators 1.2.3, 2.3.1, and 2.3.3.

Indicator 3.3. There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.

Condition

To improve the deficiencies in performance for this indicator, it is important that the fishery be able to determine the effects of pollock fishing on other species in the area other than Steller Sea Lions. Specifically, SCS is requiring that the fishery also collect data on harbor seals, kittiwakes and murres, when conducting the work required under Condition 2.3.1.

MSC Principle 3

Indicator 1.2 The management system incorporates and applies an effective strategy to manage ecological impacts of fishing *[Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]*

Condition

To improve deficiencies in performance for this Indicator, the fishery is required to:

3. Meet the requirements for conditions under Principle 2, Indicator 2.3.1 that requires the fishery to demonstrate its ability to perform ecosystem-based management by designing and performing scientifically creditable tests of the ecological impacts of the fishery on Steller sea lion foraging; and
4. Follow the requirements under Principle 2, Indicator 1.1 that call for incorporation of specific ecosystem management considerations and goals into the development of ABCs for the fishery for presentation to the SSC and to the North Pacific Council.

Indicator 2.2 The fishery is managed and conducted in a manner that respects domestic law *[Relates to MSC Criterion 3.16]*

Condition

To improve the deficiencies in performance for this indicator, the fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy. The fishery must, in particular, meet the terms of the Order dated April 1, 2003, which sets specific deadlines in 2003 and 2004 for completion of ESA- and NEPA-related analyses and procedures. That Order requires NMFS to revise its 2001 Steller sea lion biological opinion not later than June 30, 2003 and to issue the final PSEIS (and a decision based on the analysis) not later than September 1, 2004. The revised Steller sea lion biological opinion was signed on June 19, 2003.[84] As of May 2004, NMFS reports that it expects to release the final PSEIS in June 2004, and will issue a final Record of Decision based on the EIS not later than September 1, 2004.[85]

The evaluation team advises that it will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species unless the impacts of those activities on listed species are analyzed and documented in a manner consistent with the high standards of scientific technique and public involvement of which the fishery management system is capable. The scoring of this indicator will be revisited, and likely revised downward, if a court finds that the fishery is being managed in a manner that fails to comply with any significant provision of applicable law, whether or not the issue in question has been the subject of prior disputes.

<u>Indicator</u> 3.1 The management system solicits and takes account of relevant information *[Relates to MSC Criterion 3.2]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must take affirmative steps to ensure that information and opinions submitted by stakeholders who do not represent the interests of the commercial fishing industry are given fair, professional, and transparent evaluation at all levels of the management system. The assessment team requires that the management system, ideally NMFS or the Council, commission, publish, and openly review an independent evaluation of the manner in which non-industry stakeholder information and opinions have been addressed in a representative set of circumstances identified by stakeholder interests. The evaluation should identify opportunities for procedural and substantive improvements, including measures to provide greater transparency and accountability to the process. The assessment team believes that the North Pacific Council and NMFS both would benefit from a candid evaluation of the quality and character of the procedures and practices by which the various layers of the management system invite and accommodate information that challenges the status quo. The management system should consider this type of inquiry to be fundamental to achieving continual improvement in the quality of its management practices and, thus, its service to the public. Though not a requirement, the assessment team recommends that the independent review consider the recommendations for improvement in Council processes proposed by the Heinz Center in 2002, the Pew Oceans Commission in 2003, and the U.S. Commission on Ocean Policy in 2004.

The evaluation required by this condition must be performed and published not later than 18 months following finalization of this assessment report. The North Pacific Council must consider and discuss in a regularly-scheduled public meeting the evaluation report,

[84] http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/703remand.pdf
[85] http://www.fakr.noaa.gov/sustainablefisheries/seis/news13.pdf

including all recommendations, not later than 6 months following publication of the report. The Council's actions, if any, in response to the report will weigh heavily in future reviews of the fishery management system and may significantly affect the score for this indicator.

<u>Indicator</u> 3.5 The management system presents managers with clear, useful, relevant information, including advice *[Relates to MSC Criterion 3.2]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the Condition required under Principle 3, Indicator 2.2 above.

<u>Indicator</u> 4.1.1 Catch levels are set to maintain high productivity of the target population and the ecosystem *[Relates to MSC Criterion 3.10]*

Condition

To retain certification, the fishery must implement the harvest level and biomass level related conditions associated with Indicators 1.1.1.5 and 1.1.2.1 under Principle 1 and Indicator 1.1 under Principle 2.

<u>Indicator</u> 4.1.6 Provides for rebuilding and recovery, where applicable *[Relates to MSC Criterion 3.10]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the same conditions that are required under indicator 1.1.1.5 for Principle 1. No additional work would be required at this time.

<u>Indicator</u> 4.1.8 Incorporates no-take zones, and MPAs, or other mechanisms, where appropriate to achieve harvest limits and ecosystem protection objectives *[Relates to MSC Criterion 3.10]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must meet the conditions described under Principle 2, Indicator 2.3.1.

<u>Indicator</u> 5.1 The management system provides for internal assessment and review *[Relates to MSC Criterion 3.3]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must demonstrate the existence of a periodic, candid and authoritative internal review process for pollock fishery management procedures and outcomes and publish the results of such a review process. The initial review must address the issues expressed and implied by the five questions posed above (see page 216). A subsequent review must be performed not later than two years following the initial review. The managers may wish to consult with the U.S. Institute for Environmental Conflict Resolution or other entities with expertise in dispute resolution in the context of natural resource management. The terms of this condition must be fulfilled within one year after final approval of this assessment report.

<u>Indicator</u> 5.3 The management system includes guidelines for responding to assessment outcomes *[Relates to MSC Criteria 3.3, 3.7]*

Condition

To improve the deficiencies in performance for this indicator, the fishery must demonstrate the use of objective criteria in the system required under Indicator 5.1 - the internal evaluation of the pollock fishery management system's performance.

12 MSC LOGO LICENSING RESPONSIBILITIES

As the "applicant" for certification of the Gulf of Alaska pollock fishery, the At-sea Processors Association is the only entity that has the right, if the fishery is eventually certified, to apply for a license to use the MSC logo. It is the MSC's policy is to avoid "free riders" by restricting MSC logo and labeling rights only to the applicant and its assignees. To date, APA has assigned the rights to 4 companies: Trident Seafoods Corp., Westward Seafoods, Icicle Seafoods, and Peter Pan Seafoods.

13 MSC OBJECTIONS PROCEDURES

Since the beginning of this assessment the MSC has confirmed and issued a formal Objections Procedure and re-issued the MSC certification methodology (Version 5, April 2004). Although not required by the assessment methodology that applies to this certification (MSC Certification Methodology Version 3), SCS is undertaking to append all documents relevant to the Objections procedures for this fishery assessment to facilitate transparency and stay current with MSC procedures to the extent possible. Details of the MSC Objections Procedures are available at www.msc.org.

The basis of the MSC Objections Procedures are that once a Certification Body, in this case SCS, makes a determination on certification of a fishery, the final report (including all scores) is issued for a final one month consultation process. Anyone wishing to object to the determination made is then able to do so. An objection was lodged against the determination made for this fishery by Alaska Oceans Program (AOP), Greenpeace

International, and National Environmental Trust (NET). The steps involved in the Objection Process were as follows:

- Issue of Final Report by SCS,
- Statement of intent to lodge an objection by AOP, Greenpeace, and NET,
- Receipt of Initial Objection ,
- SCS Response to Objection,
- Further Objection to MSC by AOP, Greenpeace, and NET,
- MSC decision to convene Independent Objection Panel,
- Report of Objection Panel.
- SCS Response to the MSC Objections Panel
- Formal Acceptance by the MSC Objections Panel of SCS Response

In summary, an objection was filed with SCS by AOP, Greenpeace, and NET. SCS provided a response to the objecting parties that was deemed unsatisfactory by the objecting parties. The objection was then re-filed with the MSC. The Objection Panel convened by the MSC produced a final determination that agreed with the SCS draft determination and the response provided by SCS to the original objections. However, the MSC Objections Panel remanded the determination to SCS with a specific requirement for language clarifying the intent of the scoring guideposts under Performance Indicator 1.1.2.1. SCS provided revised language clarifying the scoring guidepost, which was accepted by the MSC Objections Panel.

Relevant documents are appended to this report (Appendix 7).

14 AT SEA PROCESSORS ACTION PLAN FOR MEETING REQUIRED CONDITIONS OF THE GOA POLLOCK FISHERY ASSESSMENT

Action Plan for Meeting the Conditions For Continued Certification of the Gulf of Alaska (GOA) Pollock Fishery

The At-sea Processors Association (APA) submits this Action Plan for Meeting the Conditions for Continued Certification of the Gulf of Alaska (GOA) pollock fishery. APA agrees to make a good faith effort to meet the intent of the Conditions set forth in the certifier's July 2004 Final Report determining that the GOA Alaska pollock fishery is sustainably managed under the MSC Principles and Criteria. Furthermore, APA recognizes its responsibility as the Applicant/Licensee in the certified fishery to comply with annual surveillance audits by an accredited MSC certification body. APA has entered into a written agreement with Moody Marine Ltd. to perform the required audits, including monitoring implementation of Conditions set forth in this Action Plan.

Pursuant to an understanding between APA and the certification body, Scientific Certification Systems, Inc., and consistent with MSC policy, APA is willing to assign

MSC logo and labeling rights to non-APA GOA pollock producers who agree to share the cost of maintaining the certification and to join in good faith efforts to meet the Conditions.

While APA agrees to undertake good faith efforts to meet the Conditions, the association is on record challenging the basis for certain Conditions, questioning the feasibility of the management authority to undertake certain actions, and asserting that some Conditions exceed the scope of the assessment process. Such concerns were transmitted to the certification body in writing by the Applicant, by participants in the GOA pollock fishery and by the National Marine Fisheries Service (NMFS). APA appreciates the consideration provided by the assessment team and certifier to issues raised by all stakeholders in the process. However, we note that a number of concerns raised by Alaska pollock producers and NMFS with regard to the Conditions remain. In fulfilling our obligations, we intend to provide to the appropriate certification body relevant information developed subsequent to the drafting of Conditions. We seek a flexible and adaptive program that will permit us to meet the intent of the Conditions based on the best information available.

Some of the concerns expressed by APA relate to shortcomings in the structure and administration of the MSC program. On July 8, 2004, APA co-signed a letter to the MSC suggesting needed improvements in the program. At least two of the issues raised in that letter pertain to the development of Conditions for the BS/AI and GOA pollock fisheries. The first issue is that the MSC must establish consistency among assessments. In APA's view, both the BS/AI and GOA pollock fisheries were held to a different and much higher standard than any other Applicant fishery, creating competitive disadvantages that should not be present in either a science-based or market-based program.

A second issue is that APA, as a private sector Applicant, is not always in a position to effectuate the changes in management that the certification body may seek. Under such circumstances, the MSC certification methodology should require certification bodies to consult and cooperate fully with both the Applicant and the affected management authorities in drafting Conditions. Without such collaboration the assessment team is deprived of insight and expertise needed to propose improvements in candidate fisheries that best achieve conservation and management objectives in domestic law as well as the MSC's sustainability standard.

APA's Approach to Meeting the Conditions for Continued Certification.

APA will establish the Alaska Pollock MSC Certification Committee to develop and direct a program to give effect to this Action Plan for meeting the Conditions for the BS/AI and GOA pollock fisheries. The Alaska Pollock MSC Certification Committee is composed of participants in the BS/AI and GOA pollock fishery, their representatives and APA staff. The Committee could also enlist outside experts to assist with tasks needed to meet obligations under the Action Plan.

The Alaska Pollock MSC Certification Committee will consider the range of resources available to assist in the task of responding to Conditions, including possible collaboration with the Pollock Conservation Cooperative's (PCC's) Research Committee. The PCC's membership is substantially the same as the membership of APA. Among other responsibilities, the PCC Research Committee is the principal conduit between the PCC and the University of Alaska/Fairbanks (UAF), both of which entered into a partnership in 2000 to support a comprehensive marine research grants program. The UAF/PCC Research Center is funded by APA/PCC member companies and is reportedly the largest private sector marine research program in Alaska. To the extent that certain Conditions can be achieved through private sector initiatives, the UAF/PCC Research Center could be an important partner.

APA also works closely with other North Pacific marine research organizations, including the North Pacific Research Consortium, the North Pacific Research Board, the Alaska SeaLife Center and various other organizations committed to improving understanding of the GOA ecosystem. Many of the issues raised in the Conditions are being addressed by work conducted by, or sponsored by, the organizations identified above. APA will provide to the certifier information and findings developed by these respected organizations relevant to Conditions established for the GOA Alaska pollock fishery.

Most importantly, the Alaska Pollock MSC Certification Committee will coordinate with the NMFS Alaska Region office and Alaska Fisheries Science Center (AFSC), the North Pacific Fishery Management Council (the Council), and other participants in the management process, as necessary, in an effort to meet the Conditions established by the certification body.

Proposed APA Activities in Achieving the Conditions.

There is necessarily overlap among Performance Indicators, resulting in duplication of Conditions as well. After considering redundancies, the Final Report essentially sets out 14 Conditions. The following details how APA will address each of these 14 Conditions. In the majority of instances, the conditions for the GOA pollock fishery are the same as those for the BSAI pollock fishery. In each of these cases where the conditions are the same, APA will follow the same action plan as produced for the BSAI fishery. For the few conditions that are different, APA has proposed additional steps to complete the GOA Pollock Action Plan.

MSC Principle One.

Condition #1—

Indicator 1.1.1.5--The harvest strategy can be shown to be precautionary.

Condition: To improve the deficiencies in performance for this indicator, SCS requires that formal evaluation and testing of the robustness of current and any proposed new harvest strategies used to manage GOA pollock be undertaken, using methods similar to those recommended by Goodman et al. (2002). The SCS evaluation team requires that any plans to correct this deficiency lay out a step-wise plan with timelines such that at least three stages of work would be available for evaluation:

1. Prepare detailed specifications for the evaluation.
2. Undertake the evaluations.
3. Modify harvest strategies as appropriate from the results of the evaluations. (Uptake to follow NPFMC due process)

Notes related to tasks:

Designing and implementing a management strategy evaluation study is a complex task, and the SCS evaluation team does not seek to prescribe precisely how it should be done. Nevertheless, the SCS team sees this condition as the key one that will help overcome most of their concerns with regard to Principle 1, and wishes to maintain an active involvement in monitoring progress in meeting the condition. The SCS team also considers it prudent that there be suitable opportunity for input from key stakeholders in the fishery. (Where there is substantial disagreement between stakeholders, the SCS team will be the final arbiters). Whoever is contracted to undertake the task would do well to consult and be guided by the fairly detailed proposal in sections 3.10 and 3.11 of Goodman et al (2002) as this will be used by the SCS team as a benchmark, noting that those specifications are for testing generic NPFMC harvest strategies, and will need to be adapted for the specific circumstances of GOA pollock.

In general, task 1 will involve specifying the set of performance measures against which the harvest strategies will be judged, the set of robustness tests to be undertaken, the detailed specifications of the operating models to be used, and the range of harvest strategies to be evaluated. The latter should include monitoring and assessment models as well as harvest control laws, noting that some simplification of detailed assessment models may be required for computational efficiency in testing harvest strategies. The robustness tests should include, at a minimum, the impacts of environmentally driven changes in productivity and the impacts of episodic recruitment. They should deal explicitly with key issues and uncertainties identified elsewhere in this report and cross referenced to this condition. Consideration should be given to including operating models that go beyond single species dynamics, where these are available or can be developed in suitable timeframes, and performance measures should include consideration of impacts on predators. The detailed specifications and proposal for work should be presented and discussed at an open workshop as soon as practical following certification. The proposal should specify who will undertake the work, the timelines involved, and the resources allocated to the task. At least one member of the evaluation team should attend the workshop.

The work program is to be agreed by the SCS evaluation team and the group undertaking the evaluations. The timelines can not be pre-specified, but will depend on the nature and complexity of the agreed work program. To maintain certification, progress on agreed tasks will be checked during surveillance visits at the specified time frames, or at the annual audits required by MSC if the time frames coincide.

The results of the evaluations will be made available to NPFMC, and will be presented at a second open workshop. Appropriate responses to the evaluations, including suggested changes to current harvest strategies, will be discussed and agreed in principle. Uptake of changes will follow through the due process of NPFMC decision making.

APA's Plan for Condition #1: *This Condition and the Action Plan response are similar to Principle 1; Indicator 1.1.1.5 in the BS/AI pollock fishery report. The assessment of the Alaska pollock fisheries began in January 2001. The GOA fishery was "scored" by the assessment team in 2002, and a comprehensive Draft Report recommending certification of the GOA pollock fishery was completed in October 2003. A Final Report was published in July 2004, and the Objections process continued into*

2005. Necessarily, the assessment team had to conclude its consideration of new information pertaining to this dynamic and ever-improving fishery and make its determination about the fishery's compliance with the MSC's sustainability standard. With some exceptions, the certification is based on information available to the assessment team when the GOA fishery was scored in 2002. As a result, there is considerable new information to provide to the certification body on changes and improvements in fishery management practices. Condition #1 is a good example of where substantial new information exists and should be considered by the certification body during the first annual audit.

APA will provide the contracted certification body with the final AFSC report relating to issues identified in the Goodman report immediately after issuance of the certificate or within 1 month of its availability if it is not immediately available. If the AFSC report is not available within 6 months of the issuance of the MSC certificate, APA will request a meeting between APA, NMFS, and the certification body to discuss the status and progress of the AFSC report.

If the AFSC report is available within 6 months of the issuance of the certificate, APA will request a meeting between APA, NMFS, and the certification body no later than six months after issuance of the certificate to discuss what actions will be taken in follow- up to the AFSC report and whether these actions will correspond to the requirements of the condition.

Within three months after the meeting between APA, NMFS, and the certification body (nine months after issuance of the certificate), APA will provide the certification body with a revised action plan for meeting the remaining objectives of this condition. The revised action plan should show how the condition will be met within six months after the meeting (15 months after the date of issue for the certificate).

Condition #2—

Indicator 1.1.2.1: Current stock sizes are assessed to be above the appropriate limit reference point.

To improve the deficiencies in performance for this indicator, SCS requires that:

1. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better

balance between stock protection, minimizing impacts on predators, and exploitation.

2. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the impacts of fishing on recruitment variability and stock abundance.
3. The GOA plan team should recommend strategies to improve reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).

APA's Plan for Condition #2: *APA maintains its long-standing objection to the Principle One Performance Indicator (PI) 1.1.2.1 and the associated Scoring Guideposts. Our objection centers squarely on the stock-biomass-based nature of both the PI and its Scoring Guideposts. The MSC certification is intended as an independent benchmark for best practices in fisheries management and not a measure of fish-stock biomass at any particular moment in time. In our view, it is the management actions that remain under the control of the fishery management system, and so it is the management actions based on a given level of stock biomass and associated ecosystem conditions that should be the subject of MSC standards and evaluation (i.e., the fishery assessment, including the research tasks on which it must rest, and the harvest control rule).*

We note that PI 1.1.2.1 is the only Principle One indicator that is not focused on management actions, an observation also made by the MSC Objections Panel in their recent review of stakeholder objections concerning the low stock size for GOA pollock (paragraph 3.1). Furthermore, we note the applicability of MSC Principle One, Criterion One, as referenced in the MSC Objections Panel Report. Twenty-two performance indicators were developed to provide an operational interpretation of Criterion One, and they appropriately focused "on testing and improving the fishery assessment and harvest control rule."

> *"(T)he fishery shall be conducted at catch levels that continuously maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity."*

The focus in this Criterion is on the conduct of a fishery "at catch levels" — not at stock biomass levels.

While we disagree with the Objections Panel that B_{MSY} is a suitable limit reference point for biomass in interpreting MSC Principle One, we agree with the Panel that constant B20% was considered by the certification team in their scoring of MSC Principle One. In fact, this single constant value for B20%, which provides a fixed minimum biomass below which no directed fishing is allowed, was considered explicitly in the scoring of PI 1.1.1.3 by the certification team. (The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes.)

As such it seems incongruous that the Objections Panel would remand the certification report back to the certification team, essentially to add an additional component to the 60 Scoring Guidepost of PI 1.1.2.1 which was plainly considered in the scoring of PI 1.1.1.3. In our opinion, this situation results from the flaw in the rational basis for the PI 1.1.2.1 described above, and the resulting confusion in the interpretation of Principle One Criterion One that it generated, and which formed the basis of the Objection Panel's consideration of the low stock biomass issue.

We raise this issue to continue the dialogue with the certification body about our concerns during the annual surveillance audits and to address comments of the MSC Objections Panel Report for the GOA pollock fishery. With respect to the latter, paragraphs 3.20 and 5.7 of the Objections Panel report advises that under current MSC procedures there is reason to believe that the GOA fishery could be de-certified if the stock biomass drops below the constant B20% threshold "as it approaches the low point in the production cycle."

Given the current harvest control rule, which under PI 1.1.1.3 received a score of 85, directed fishery would be suspended if the biomass drops below such a threshold. The industry is on record supporting the current harvest control rule as a means to protect other ecosystem consumers of pollock. We do not agree that having the management system take the appropriate, precautionary action, however, should result in de-certification of the fishery. Such action is fundamentally at odds with the stated purpose of the MSC program, which is to recognize precautionary, ecosystem-based management systems. In sum, because PI 1.1.2.1 is focused on stock biomass and not catch levels, implementing the appropriate management action could be welcomed by loss of MSC certification.

With that background, the following is APA's planned course of action. Condition #2 (provision #1) will be met under the GOA Action Plan response to Condition #1 (see above).

Condition #2 (provision #2) recommends that the SSC review Appendix C of the 2003 GOA pollock assessment found in the 2003 GOA SAFE report. Within one month of issuance of the certificate, APA will provide the contracted certification body with the SSC minutes from the December 2003 meeting for review and consideration of whether the information provided meets this provision of the condition. The information provided should contain not only the final determination by the SSC, but as stated in the condition a review of the information such that the certification body can determine if the review satisfied the provision in this condition.

APA believes that the minutes of the meeting go a long way to meeting provision #2 under condition 1.1.2.1. The SSC mentioned the many aspects of conservatism built into the 2003 assessment, in particular, an even more risk-averse harvest policy *mandated by the 2001 Steller sea lion reasonable and prudent alternative management (protection) measures. The SSC agreed with the extremely conservative approach recommended by the authors of the SAFE report and the GOA Plan Team given concerns over the low level of the pollock stock, and the NPFMC subsequently adopted the SSC recommendation.*

With regard to that part of Condition #2 (provision 3) for improving the reliability of the annual pollock acoustic abundance survey, during 2004 the assessment authors and the AFSC Midwater Assessment and Conservation Engineering (MACE) staff collaborated on the drafting of a five-year plan to investigate alternative strategies to improve the reliability of the GOA acoustic survey. The draft strategy was motivated by the 2003 GOA pollock assessment review of Godo (2003), and was presented to the GOA Plan Team at its September, 2004 meeting. In brief, the strategy developed will provide for an evaluation of the strengths and weaknesses of a more expansive spawning-season survey versus the implementation of a summer survey that would cover most if not all of the western, central, and eastern GOA management areas.

Within one month of the issuance of the GOA pollock certificate, APA will provide to the certification body the strategy developed by the AFSC MACE Program to improve the reliability of the GOA acoustic survey.

Condition #3—

Indicator 1.1.2.3.3. Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.

Condition: To improve the deficiencies in performance for this indicator, SCS requires that:

1. Consideration be given by the SSC to raising GOA pollock to Tier 1 so that the harvest strategy is more responsive to uncertainties in the assessment.
2. The Bayesian analyses already undertaken for GOA pollock be used to better present the uncertainties in the assessment, including confidence intervals on stock biomass trajectories, and probabilities that biomasses and exploitation rates exceed target and limit reference points.

APA's Plan for Condition #3: *Given the developments since the assessment team's final evaluation of the GOA pollock fishery (see a brief summary below), within three months of the issuance of the GOA pollock certificate APA will provide the certification body with a written summary (along with all pertinent background documents) on the progress which has already been made in addressing this Indicator's (1.1.2.3.3) conditions. At the same time, APA will also arrange for the certification body* *conducting the surveillance audits to discuss with the GOA pollock assessment authors additional ongoing actions that may further work to satisfy the conditions.*

If it is determined that the information provided to the certification body does not adequately satisfy all aspects of the condition, APA will provide within 30 days of the surveillance report, which is due within 30 days of providing the information to the certification body, a revised action plan for how and when the remaining work necessary to meet the condition will be completed. If the proposed time requirements for meeting the condition fully should exceed one year after issue of the certificate, APA will include milestones at a minimum of every six months up to the proposed completion date.

APA Summary of Existing Information

It is our belief that many of the activities that have occurred since the assessment of the fishery may well satisfy the requirements of this condition. With regard to giving consideration to raising the GOA pollock stock assessment to Tier 1, the Bayesian analysis included in Appendix C to the 2003 stock assessment shows estimated stock- recruitment curves for GOA pollock for the commonly used Beverton-Holt and Ricker stock-recruitment models (Figure 33). Fits of the models to the stock-recruitment estimates were similar, with estimated posterior distributions of the "steepness" parameters differing only marginally from their prior distributions. This result led the authors to conclude that the stock and recruitment estimates for GOA pollock are not very informative about the shape of the true stock-recruitment curve. The SSC reviewed this work at their December 2003 meeting.

A second issue associated with raising GOA pollock to Tier 1 (integrating an estimate of the stock-recruitment relationship into the assessment) concerns the concomitant change of stock biomass target to B35% for Tier 1 from B40% for Tier 3. The B35% stock reproductive biomass target is smaller than the current B40% target, and all else constant, would likely allow more aggressive harvest rates than currently permitted under Tier 3.

With regard to the provision of confidence intervals on stock biomass trajectories, the Ecosystem Considerations chapter of the 2004 AFSC SAFE includes a section on recent advances in developing predictive multi-species assessment and ecosystem models. In addition, the SSC and Groundfish Plan Team members convened a "Special Session Modeling Workshop" at the February 2005 NPFMC meeting which focused on standardized methods for predicting future stock biomass trajectories. The workshop developed in response to SSC concerns about the need to come up with a consistent set of standards to be used for projections of all stocks and areas. These concerns were motivated by NMFS' recent approval of BSAI and GOA Fishery Management Plan Amendments 48/48, which require that BSAI and GOA groundfish specifications be made for two years ahead instead of one.

Some of the probabilities that stock biomasses and exploitation rates could exceed target and limit reference points has already been provided in the GOA pollock stock assessments. The 2004 GOA pollock SAFE included a) confidence intervals for recruitment and spawning stock biomass (Fig. 1.22), b) uncertainty in the estimates of the 1999 and 2000 year classes (Fig. 1.26), c) uncertainty in projected spawning stock biomass and probability of the stock dropping below B20% in 2005-2008 (Fig. 1.27). Probabilities of exceeding fishing mortality limit reference points have shown in previous assessments (e.g. Fig 1.32 of the 2001 GOA pollock SAFE).

MSC Principle Two.

Condition #4—

Indicator 1.1. There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.

Condition: To improve the deficiencies in performance for this indicator, the fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries.

Fisheries science is still developing methodologies for introducing environmental parameters into fisheries models and the state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further such development, and so some time is required to allow the necessary developments (see below).

The plan must show how the authors of the 'Ecosystem Considerations' chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures.

APA's Plan for Condition #4: *This Condition and Action Plan response are identical for the BS/AI and GOA. The certification report notes that the "state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further…development (of fisheries science)". Importantly, the Final Report also notes repeatedly that management in the North Pacific is widely viewed as progressive and precautionary. Recognizing that the AFSC is consistently* *recognized for its leading edge practices, APA proposes this step-wise approach to meeting the Condition.*

APA will have a qualified individual, including contracting with an outside expert if necessary, review the literature to evaluate what constitutes state of the art practices in incorporating ecological indices into estimation of ABCs. Furthermore, APA will assess the extent to which AFSC incorporates such information into its annual SAFE report recommendations for groundfish fisheries, including recommendations on the pollock ABC. Based on its review of existing knowledge and methodologies, APA will identify in what areas, if any, AFSC's analysis could be enhanced. APA will have the report peer reviewed by at least one expert chosen in consultation with the certification body. APA will present its findings to the certifier at the first annual audit, and if the certifier agrees that the report is appropriate, APA will share its findings with AFSC and urge the agency to consider including such revisions in its annual SAFE reports. Furthermore, prior to the first annual audit APA will meet with AFSC staff to better understand the resources available to the agency and developments in ecological theory and provide to the certifier an assessment of the AFSC's long-term plan for further incorporating ecological indices in the ABC setting process.

Condition #5—

Indicator 1.2.1. Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.

Condition: To improve the deficiencies in performance for this indicator, the fishery must improve assessments of impacts on habitats as follows:

1. Provide the certification body with information on ongoing research projects to determine the impact of pollock fishing, if any, on SSL critical habitat with particular emphasis on the effects of fishing, if any, on foraging sea lions.
2. Meet Condition 3.1 – thus provide a thorough written review of gear loss from pollock fishers and its impacts on habitats
3. Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds. We require that the certification body be provided a summary of the current state of knowledge on the identified issue areas of concern and that targeted, clearly defined research programs be undertaken, if necessary, after consultation between the certification body and the fishery based on the findings of the written reviews.

APA's Plan for Condition #5: *With the exception of the reference to fur seals in the BS/AI report, this Condition and Action Plan response for the BS/AI and GOA are* *identical. Within 12 months, APA will provide to the certification body a comprehensive report documenting research completed since summer 2002 on the effects of pollock fishing, if any, on SSL critical habitat as well as discussion of ongoing research projects relating to the impact of pollock fishing, if any, on foraging sea lions. AFSC informs APA that the agency conducted research in 2004 (the so-called Chiniak study) on this specific issue. The report will include also discussion of research results reported in 2004 indicating that localized depletion of Pacific cod was not evident in an AFSC experiment that included control areas and areas in which cod trawling occurred.*

APA believes that it would be beneficial also to provide to the certifier an update on research on competing, and perhaps more salient, hypotheses relating to SSL populations, including the effects of "regime shifts" and killer whale predation on SSL populations.

APA will also provide a written review prior to the first annual audit by the certifier of the effects, if any, of the de minimis amount of fish discarded by GOA pollock fishing vessels on scavenging seabirds. AFSC reports that Dr. Ann Edwards, a post doctoral fellow from the National Research Council, will be conducting relevant research on this topic. APA will provide to the certifier progress reports prepared by Dr. Edwards as well as the project's findings. Additionally, APA is participating in a seabird study that will include an inquiry into seabird foraging activities and potential interactions with pollock catcher/processor vessels. This study is partially funded through a grant by NMFS. APA will present the results of this NMFS-funded research program to the certifier prior to the first annual audit.

Condition #6—

Indicator 1.2.3. Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.

Condition: To improve the deficiencies in performance for this indicator, research must be implemented to describe:

1. Relationships between Steller sea lion (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the regional scale related to stock size and stock geographical distribution;
2. Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling;

3. Plans for these research projects will be sent to the SCS team for review, and then initiated no later than the following calendar year. Where research leads to new information relevant to management, appropriate changes in management will be required.

APA's Plan for Condition #6: *This Condition and Action Plan response are substantially the same for the BS/AI and GOA pollock fisheries. APA will provide a thorough written report to the certification body within 6 months of the issuance of the certificate on the status of research relating to SSL foraging behavior and pollock prey abundance at the regional and local scales. While the Condition calls for research to be "implemented," APA believes that the accounting of NMFS' research program provided under APA's responses to other Conditions will satisfy this Condition. APA will include in its report an assessment of work on this issue funded by the FY 2005 appropriations bill for NOAA, which was enacted in late November 2004.*

APA proposes that the certifier focus on this issue at the first annual audit. APA will request a meeting with relevant AFSC staff, the certifier and APA so that the certifier can understand fully the agency's program with regard to this issue.

Tasks performed under other Conditions will be coordinated with the response to Condition #6.

Condition #7—

Indicator 1.3.3. Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.

Condition: To improve the deficiencies in performance for this indicator, the fishery must provide the SCS team with information on ecosystem modeling being carried out to investigate whether increases in jellyfish or arrowtooth flounder are likely to be due to reductions in pollock biomass consequent to fishing.

Concerns regarding the relationship between the pollock fisheries and SSLs are dealt with under Indicator 2.3.1.

APA's Plan for Condition #7: *Within six months of the issuance of the GOA pollock certificate APA will meet with the authors of the GOA food-web model and request that a sensitivity analysis be carried out whereby perturbations to the pollock biomass, similar in scale to historic fishery removals, are analyzed with regard to their possible effects on arrowtooth and jellyfish biomass in the GOA. Prior to the first annual audit, APA will provide the certification body with a summary of the analyses conducted* *by NMFS. If the certification body determines that the information does not adequately satisfy the condition, APA will within three months of the annual surveillance provide a revised action plan to the certification body outlining how and when the condition will be fully met.*

APA Summary of Existing Information

APA believes that research carried out since the completion of the original assessment may well satisfy the condition. With regard to whether increases in jellyfish or arrowtooth flounder are likely to be due to reductions in GOA pollock biomass consequent to fishing, ecosystem modeling in the GOA has advanced since the certification team first examined the pollock fisheries. In particular, researchers at the AFSC have now parameterized a stock-scale food-web model of the GOA. The model consists of 130-140 functional (species) groups, including lower trophic levels, fish, birds, and mammals. The purpose for developing the model is to provide stock assessment authors with information and biomass time trends appropriate for identifying possible predator, prey, or bottom-up forces that might be influencing fish-stock growth and distribution patterns (2004 AFSC SAFE Ecosystem Considerations for 2005, pp. 35-36). The GOA model includes pollock, arrowtooth flounder, and jellyfish as species groups and could be used to investigate whether increases in jellyfish or arrowtooth flounder are likely the result of reductions in GOA pollock biomass due to fishing.

In addition, the 2004 GOA pollock assessment includes a new section on ecosystem considerations that draws on results from the GOA food-web model to evaluate potential first-order trophic interactions between pollock and other ecosystem components. These results indicate that arrowtooth flounder is the most significant predator on both juvenile and adult walleye pollock, with predation of adult pollock by arrowtooth flounder estimated at more than twice the level of the trawl fishery (Figure 1.31). Further, gelatinous zooplankton are believed to comprise very small fractions (less than five percent) of the diet of both juvenile and adult walleye pollock (Figure 1.30). As such, it is difficult to imagine potential trophic linkages that would allow the adult pollock biomass to control either arrowtooth flounder or jellyfish biomass in the GOA.

Condition #8—

Indicator 2.1. The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.

Condition: To improve the deficiencies in performance for this indicator, the fishery must:

1. Adjust management as described in the Conditions under Indicator 1.1.
2. Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.

APA's Plan for Condition #8: *This Indicator and Condition have identical wording to the BS/AI report. The Action Plan response for the GOA has been amended to reflect the differences in the two fisheries. Item #1 of this Condition is discussed in Condition #4 of the Action Plan. Item #2 above contains an apparent contradiction by requesting that NMFS publish information on bycatch in the pollock fishery on a vessel-by-vessel basis while noting that such action would violate confidentiality rights provided to fishers under the Magnuson-Stevens Act. The reports correctly note the de minimis discard levels in the BS/AI and GOA pollock fisheries and note that the agency maintains an excellent pollock catch data programs as part of NMFS' precautionary approach to minimizing the impacts of fishing on the environment.*

APA will request that NMFS prepare a report within 12 months that meets the issues raised in provision #2 of Condition #8. APA will provide the report to the certification body. APA will request a meeting with NMFS and the certification body to determine the utility of such report, and if it is found to be useful, determine the feasibility of the agency preparing such a report on an annual basis.

Condition #9—

Indicator 2.2.1. The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act.

Condition: With regard to Steller sea lion (SSLs), current management measures regulating fishing in SSL critical habitat were developed, in large part, based on satellite telemetry data collected to define important SSL foraging areas. To improve the deficiencies in performance for this indicator, the team calls for rigorous peer review of the telemetry data analysis given the significant role of the telemetry data in setting the regulatory regime. Given these considerations, the evaluation team sets for the following conditions:

1. The analysis of the satellite telemetry data and results used to justify the 2001 BiOp should be subject to external peer review and the results of such review shall be available to the certifier within 6 months of issuance of the certificate for the GOA fishery. NMFS should submit the telemetry data analysis to the Center

of Independent Experts (CIE). The University of Miami's CIE administers a review process, drawing from a formal pool of qualified scientific experts, ensuring the selection of a panel free from the influence of either NMFS or other groups with a vested interest in the review's findings. It is very important that the panel should contain 2 or members with expertise in the analysis of PTT data from marine vertebrates.

2. The management system should consider the input received from the CIE review and act appropriately.

APA's Plan for Condition #9: *With the exception of references in the BS/AI report to northern fur seals, this Indicator, Condition and Action Plan response are the same between the two reports.*

APA believes that significant internal and external peer review of the referenced telemetry data has occurred since the initial drafting of this Condition in 2002, including reviews conducted under the auspices of the Center for Independent Experts (CIE). Should the CIE reviews not be published by the first annual audit, APA will request of NMFS that the certification body be allowed to review draft reports or that NMFS provide a presentation to the certification body summarizing the CIE findings. APA will also submit to the certification body reviews conducted under the CIE program when such reviews are published. APA will also provide summaries of other relevant papers, articles or other published material relating to this subject. APA will consult with the certification body on the findings and determine whether follow-up discussion with AFSC is necessary.

As a side note, the certification body should also be aware that presentations by NMFS' scientists at a September 2004 Sea Lions of the World Conference in Anchorage reported promising results of increases in sea lion populations in the BS/AI and GOA areas. Noting the National Research Council's 2003 report determined that fishing activity is a second-tier hypothesis proposed to explain the decline of SSL populations and recent NMFS reports of increasing SSL populations, the certification body might consider re-evaluating the scope of work required under this and other similar Conditions after reviewing scientific findings since 2002.

Condition #10—

Indicator 2.3.1. Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.

Condition: To improve the deficiencies in performance for this indicator, the fishery must design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on SSL behavior, breeding and population trends. The NRC report

(Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002) recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. We support the goals and objectives of the NRC's prescribed action, but appreciate that it would be inappropriate to suggest increasing pollock fishing intensity to levels that increase jeopardy (in the legal sense) to SSL populations and that there are complex scientific and legal issues involved. Therefore, it will be necessary to design this experiment in such a way that comparison can be made between areas where fishing intensity is reduced with areas where it is maintained at levels comparable to those in the recent past (but perhaps within this limit still increased by as much as the decrease in harvest lost to industry from reduced fishing areas). The hypothesis to test would then be that SSL numbers or productivity in reduced fishing areas would show a positive deviation relative to values in fished areas, and the null hypothesis that performance of SSL would be no different between areas. Such an experiment should be underway no later than 2006.

APA's Plan for Condition #10. *This Condition is identical for the BS/AI and GOA pollock fisheries; however, the certification body required changes from the version approved for the BS/AI Pollock Action Plan. The Final Reports on BS/AI and GOA Alaska pollock recognize the legal and practical impediments identified by fishery management authorities and scientists to conducting the controlled area experiments proposed by the National Research Council (NRC) in 2002. In addition, NMFS' scientists have provided fishery management authorities with a detailed analysis of the substantial cost of such experiments, the decades-long commitment required for such a program and the likely prospect that the findings would be inconclusive.*

Notwithstanding the issues identified above, APA is aware that AFSC is in its fourth year of research testing the localized depletion hypothesis and will continue with its program if FY 2005 funding is available through Congressional appropriation. (See discussion under Condition #5 above.) NMFS' previous work on possible fishing effects on SSLs has examined fisheries for Alaska pollock, Pacific cod and Atka mackerel. APA will request a meeting with AFSC and the certifier within six months to review research results to date and to discuss ongoing research. APA will consult with the certifier and AFSC prior to the meeting to ensure all issues relevant to both groups are addressed at the meeting. APA and the certifier conducting the post-certification audits have agreed that the members of the original assessment team shall be consulted as well. In addition, APA will propose that the meeting include a thorough discussion on the current state of research on hypotheses relating to possible effects of pollock fishing on foraging sea lions, including agency-sponsored research and research projects conducted under the auspices of the Alaska SeaLife Center, the Pollock Conservation Cooperative Research Center, the North Pacific Research Consortium, and other noted authorities such as the recent work by Dr. Marc Mangel contracted by NMFS through MRAG Americas Inc.. A review (summary of the meeting result) will be prepared by APA. In specific, the review will contain a thorough analysis of how the current research meets the condition, which is to conduct a direct experiment. APA will prepare and provide this report to the *certification body detailing actions and timelines for meeting the objectives of this condition should the results of the meeting between APA, NMFS and the certification body identify continuing research needs to meet the condition.*

Tasks performed under this Condition will be coordinated with the responses to Condition #5, Condition #6 and Condition #7.

Condition #11—

Indicator 3.3. There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.

Condition: To improve the deficiencies in performance for this indicator, it is important that the fishery be able to determine the effects of pollock fishing on other species in the area other than Steller Sea Lions. Specifically, SCS is requiring that the fishery also collect data on harbor seals, kittiwakes and murres, when conducting the work required under Condition 2.3.1.

APA's Plan for Condition #11: *With the exception of the reference in the BS/AI report to fur seals, the Condition and Action Plan response are identical. The tasks identified under Condition #5, Condition #6, Condition #7 and Condition #10 are relevant to this Condition. The tasks performed in meeting those Conditions will be completed in such manner as to fulfill obligations identified under Condition #11.*

MSC Principle Three.

Condition #12—

Indicator 2.2. The fishery is managed and conducted in a manner that respects domestic law *[Relates to MSC Criterion 3.16]*

Condition: To improve the deficiencies in performance for this indicator, the fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy. The fishery must, in particular, meet the terms of the Order dated April 1, 2003, which sets specific deadlines in 2003 and 2004 for completion of ESA- and NEPA-related analyses and procedures. That Order requires NMFS to revise its 2001 Steller sea lion biological opinion not later than June 30, 2003 and to issue the final PSEIS (and a decision based on the analysis) not later than September 1, 2004. The revised Steller sea lion biological opinion was signed on June 19, 2003.[1] As of May 2004, NMFS reports that it expects to release the final PSEIS in June 2004, and will issue a final Record of Decision based on the EIS not later than September 1, 2004.[2]

The assessment team advises that it will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for upcoming years that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species unless the impacts of those activities on listed species are analyzed and documented in a manner consistent with the high standards of scientific technique and public involvement of which the fishery management system is capable. The scoring of this indicator will be revisited, and likely revised downward, if a court finds that the fishery is being managed in a manner that fails to comply with any significant provision of applicable law, whether or not the issue in question has been the subject of prior disputes.

APA's Plan for Condition #12: *The Condition and Action Plan response is identical for the BS/AI and GOA pollock fisheries. On August 26, 2004, NMFS issued a Record of Decision documenting its decision to select the Preferred Alternative set forth in the Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement (PSEIS) for the management of the BS/AI and GOA groundfish fisheries. Within 2 months of the issuance of a certificate, APA will provide to the certifier all pertinent Court and agency documents. We believe that this material will demonstrate to the certifier that the Condition has been met. APA will also organize a meeting between APA and the certification body to review the materials and determine if further actions are required to meet the condition.*

Condition #13—

Indicator 3.1. The management system solicits and takes account of relevant information *[Relates to MSC Criterion 3.2]*

Condition: To improve the deficiencies in performance for this indicator, the fishery must take affirmative steps to ensure that information and opinions submitted by stakeholders who do not represent the interests of the commercial fishing industry are given fair, professional, and transparent evaluation at all levels of the management system. The assessment team requires that the management system, ideally NMFS or the Council, commission, publish, and openly review an independent evaluation of the manner in which non-industry stakeholder information and opinions have been addressed in a representative set of circumstances identified by stakeholder interests. The evaluation should identify opportunities for procedural and substantive improvements, including measures to provide greater transparency and accountability to the process.

[1] http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/703remand.pdf
[2] http://www.fakr.noaa.gov/sustainablefisheries/seis/news13.pdf

The assessment team believes that the North Pacific Council and NMFS both would benefit from a candid evaluation of the quality and character of the procedures and practices by which the various layers of the management system invite and accommodate information that challenges the status quo. The management system should consider this type of inquiry to be fundamental to achieving continual improvement in the quality of its management practices and, thus, its service to the public. Though not a requirement, the assessment team recommends that the independent review consider the recommendations for improvement in Council processes proposed by the Heinz Center in 2002, the Pew Oceans Commission in 2003, and the U.S. Commission on Ocean Policy in 2004.

The evaluation required by this condition must be performed and published not later than 18 months following finalization of this assessment report. The North Pacific Council must consider and discuss in a regularly-scheduled public meeting the evaluation report, including all recommendations, not later than 6 months following publication of the report. The Council's actions, if any, in response to the report will weigh heavily in future reviews of the fishery management system and may significantly affect the score for this indicator.

APA's Plan for Condition #13: *The Condition and Action Plan response are identical for the BS/AI and GOA pollock fisheries. There are few Conditions where APA disagrees more with the certification body's action than on this matter. In its original submission, APA noted that the Magnuson-Stevens Act, the Administrative Procedure Act, the National Environmental Policy Act, the Endangered Species Act and numerous other federal laws provide extensive opportunities for stakeholder participation and comment in the fishery management process. At the regional level, environmental stakeholders participate in standing and ad hoc council committees and are provided extensive opportunities for influencing Plan Teams, the SSC and the Council. Moreover, the culture in NMFS at the national and regional level is to encourage dialogue with all stakeholders, and the legitimate concerns of stakeholders are weighed equally.*

Unfortunately, certain environmental stakeholders are not content when NMFS or the Council declines to adopt stakeholder recommendations that are not supported by science. The assessment team should not be surprised that certain environmental stakeholders, particularly those funded by the Pew Trusts ocean campaign, criticize the management system when their views are not adopted wholesale by managers. Remember, these are the same organizations that petitioned the MSC to bar the Alaska pollock fisheries from being assessed under the MSC program. Also, when the assessment team and peer reviewers, who were selected from a list of candidates agreeable to environmental stakeholders, did not endorse many of the same unsupportable positions previously put to the management authority, environmental stakeholders continued bad faith efforts to undermine the sustainability determination.

Nonetheless, the certification body raises issues of transparency and accountability in the management system. As with issues raised in other Conditions, *there have been significant developments to consider since this Condition was drafted. Most prominently, the Pew Trusts' oceans campaign is lobbying aggressively to take away the authority from regional councils to develop conservation and management measures. Legislation was introduced in Congress in June 2004 that would accomplish Pew's goal, and while it was not enacted, it is likely that such legislation will be offered in the upcoming Congress.*

In September 2004, the U.S. Commission on Ocean Policy (USCOP) published its final report with recommendations intended to strengthen U.S. ocean policy, including improving fisheries management. Among other recommendations, the USCOP would enhance the authority of Councils' scientific panels and require governors to nominate non-fishing representatives as council candidates.

Congress is expected to begin work early in 2005 to reauthorize the Magnuson-Stevens Fishery Conservation and Management Act. With Congress poised to consider proposals that could dramatically transform the council system, it would not be a useful exercise to review the existing system. APA will provide quarterly updates to the certification body on Congressional action relating to Magnuson-Stevens Act reauthorization, specifically, legislative activity focusing on the structure and authority of regional fishery management councils.

If for some reason, the Magnuson-Stevens reauthorization process is not moving forward, APA will meet with the certifier as soon as practical after receiving a quarterly update that reports such information, and determine the appropriate course of action for meeting the objective of this Condition.

Condition #14—

Indicator 5.1. The management system provides for internal assessment and review *[Relates to MSC Criterion 3.3]*

Condition: To improve the deficiencies in performance for this indicator, the fishery must demonstrate the existence of a periodic, candid and authoritative internal review process for pollock fishery management procedures and outcomes and publish the results of such a review process. The initial review must address the issues expressed and implied by the five questions posed above. A subsequent review must be performed not later than two years following the initial review. The managers may wish to consult with the U.S. Institute for Environmental Conflict Resolution or other entities with expertise in dispute resolution in the context of natural resource management. The terms of this condition must be fulfilled within one year after final approval of this assessment report.

APA's Plan for Condition #14: *The Condition and Action Plan response is identical for the BS/AI and GOA pollock fisheries. APA will meet with NMFS officials* *within 6 months of the issuance of the certificate to discuss the feasibility of the internal review proposed in this Condition, including the availability of funding and the practicality of incorporating additional internal reviews into the management process. At the first annual audit, APA and the certification body will discuss the outcome of APA's consultations with the agency. APA will then submit a revised action plan and timelines within 3 months of the first annual audit ensuring that the objectives of this condition are met by the second annual audit. APA will also provide the certification body with a progress report at 6 months after the first annual audit detailing work to date on meeting the condition.*

Submitted by the At-Sea Processors Association

By: Jim Gilmore, APA

April 27, 2005

15 CONCLUSION AND CERTIFICATION

The SCS Assessment team concluded after all aspects of the MSC procedures were followed, including a full Objections Process, that the GOA pollock fishery continues to meet the standards of the MSC. The lead assessor for the assessment team presented all evidence to the SCS Certification Panel, which agreed with the assessment team's decision and authorized certification of the fishery. A certificate was issued to the At-Sea Processors Association with the determination that the GOA pollock fishery meets all requirements of the MSC program. The certificate was issued on 27 April 2005 and is valid for a period of no longer than 5 years pending continued compliance with all MSC standards and assessment team conditions as required under the MSC.

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APPENDIX 1 – ALASKA OCEANS NETWORK SUBMISSION TO ASSESSMENT TEAM

TRUSTEES FOR ALASKA

A Public Interest Law Firm Providing Counsel to Protect and Sustain Alaska's Environment

1026 West 4th Avenue, Suite 201 Anchorage, AK 99501 (907) 276-4244 (907) 276-7110 Fax Email: ecolaw@trustees.org

Sent via Email (w/o attachment) and First Class mail

April 30, 2002

Chet Chaffee
Scientific Certification Systems
1939 Harrison St., Suite 400
Oakland, CA 94612

Dear Mr. Chafee:

Please accept the attached comments on the evaluation of the Alaska pollock fisheries in the Bering Sea, Aleutian Islands and Gulf of Alaska under the Marine Stewardship Council's (MSC) Principles and Criteria for Sustainable Fishing (MSC Standard). Trustees for Alaska submits these comments on behalf of the Alaska Center for the Environment, American Oceans Campaign, Bering Sea Council of Elders, Earthjustice, National Environmental Trust and the Pribilof Islands Stewardship Council.

As discussed below and fully detailed in our attached comments, we urge you not to certify the Alaska Pollock fisheries as sustainable under the MSC Principles and Criteria.

The primary concern we have is that certification of the pollock fisheries as sustainable is simply the wrong message to send to the public, fishery managers and fishery participants regarding the prosecution of the massive pollock fisheries. For many years, we have witnessed first-hand the large risks fishery managers and participants are willing to take to justify a large pollock catch. We have also witnessed first-hand the decline of many North Pacific fisheries and fish and wildlife species in the same time frame and areas in which these fisheries occur. MSC certification of these fisheries threatens ongoing efforts to change the management of these fisheries to address these very real problems.

As we have regularly expressed since we first learned of the MSC program, the goal of utilizing market forces to influence commercial fishing is laudable. Forces that work with the market to create incentives for sustainable human interaction with the natural world hold promise, especially in those instances where government regulation has proved challenging. Of course, one challenge of the market-based approach is that the integrity of the entire market-incentive program is only as strong as the individual decisions within that program. Thus, if the hurdle for certification is set too low, the integrity of fisheries that may truly deserve certification is threatened, which in turn calls into question the legitimacy of the entire system.

It is within this context that we communicate to you now, and have communicated to you and others in the past, our very serious reservations about the management and prosecution of the Alaska pollock fisheries. As an initial matter, it seems elemental that a fishery should not even be considered for certification when it is being conducted in violation of laws designed both to protect the environment and to allow humans to understand a fishery's impacts on the environment. Our comments in the attached report provide extensive detail to you on the very troubling legal framework in which the pollock fisheries operate, and we urge you to recognize the central role this legal situation must play in your decision whether to certify the pollock fisheries.

In addition to the lawless nature of these fisheries, other factors compel the conclusion that the pollock fisheries should not be eligible for certification. One of these factors is that the fisheries are in a state of flux. They have a history of operating under emergency rules and riders to unrelated legislation. These fisheries simply will not be stable in management regime or fishing practice for some time.

As well, we are concerned about the single-species focus of the management of these fisheries. Declining stocks, recruitment-driven fisheries, reliance on single year-classes, and profound uncertainties about stock structure all raise serious doubts about claims for sustainable single-species management.

Finally, we feel it is essential to recognize that pollock constitutes an important—and in some cases critical—source of food for marine mammals, seabirds and fish in the North Pacific. Many of these species are showing signs of declining populations. These declines raise serious questions about the ecosystem effects of the huge North Pacific pollock fisheries. These largely unknown effects are just now beginning to receive research attention. For this reason, the pollock fisheries fail to meet MSC's ecosystem principle.

Thank you for your consideration of our comments. Should you have any questions or desire further information, please do not hesitate to ask.

Sincerely,

Ann Rothe
Executive Director

Cc: Marine Stewardship Council

Concerns with the Alaska Pollock Fisheries Regarding the Marine Stewardship Council Sustainability Certification Review

Prepared for Trustees for Alaska by:

Stacey Marz
Consultant

Ken Stump
Consultant

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EXECUTIVE SUMMARY

Walleye pollock (*Theragra chalcogramma*) is a prolific member of the cod family of fishes (*Gadidae*). This fish is the target of the Alaska pollock fisheries, the largest in the United States and perhaps the world, supplying the world whitefish trade in surimi and fish fillets. The pollock fisheries occur in the U.S. Excusive Economic Zone (EEZ) from 3 to 200 nautical miles (nm) offshore in the North Pacific off of Alaska in the Bering Sea, including the area around the Aleutian Islands, and the Gulf of Alaska. These fisheries are of special concern due to their enormous size, depleted stocks, and the importance of pollock in the marine food webs of both the Bering Sea and the Gulf of Alaska.

The Magnuson Stevens Act[86] established the legal framework for managing the Bering Sea / Aleutian Islands (BSAI) and Gulf of Alaska (GOA) groundfish fisheries. Fishery Management Plans (FMPs) govern the fisheries according to the Act as well as other federal mandates including the National Environmental Policy Act (NEPA). The Magnuson-Stevens Act contains ten national standards that serve as overarching policy goals for federal fisheries management. The Act established the North Pacific Fisheries Management Council (Council) to serve as a policy advisor to the Secretary of Commerce who has ultimate authority over the federal fisheries. The Council develops FMPs, amendments to FMPs, and regulatory amendments and submits them to the Secretary of Commerce for review. If the Secretary approves, the FMPs and amendments are implemented by federal regulation. Once the regulations are in effect, the National Marine Fisheries Service (NMFS) is responsible for managing the fisheries.

Two FMPs govern the pollock fisheries: (1) the FMP for the Groundfish Fishery in the BSAI area, and (2) the FMP for the Groundfish Fishery in the GOA. The Secretary of Commerce approved these FMPs in 1978 and 1981 respectively. Since the original Environmental Impact Statements (EISs) pursuant to NEPA were written over twenty years ago for the FMPs, the BSAI FMP was amended 71 times and the GOA FMP was amended 62 times. Despite the long time that has elapsed and the numerous changes that have occurred to the FMPs, NMFS has not examined the FMPs in their entirety or evaluated the environmental impacts of the groundfish fisheries on the North Pacific ecosystem. The federal district court, however, has ordered NFMS to prepare a programmatic EIS for the North Pacific groundfish fisheries that is expected to be complete by the end of 2003.

In the Bering Sea, primarily Seattle-based catcher-processors harvest pollock, operating pelagic trawl nets from vessels that are as long as 300 feet. In the Gulf of Alaska, pollock is caught by both pelagic and bottom trawling catcher vessels that are primarily under 124 feet long. The vessels that fish the Gulf are based out of Kodiak, Dutch Harbor, Sand Point and the Alaska Peninsula, Seattle and Newport, Oregon. Pollock fishing occurs from January 20 to November 1 in each calendar year.

In 2000, the Alaska pollock fisheries caught 1.2 million mt of pollock, which accounted for 66% of the total groundfish caught.[87] The BSAI fleet caught 1,134,000 metric tons of pollock in 2000.[88] In

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[86] This Act is currently known as the Magnuson Stevens Fishery Conservation Management Act.

[87] Terry Hiatt, Ron Felthoven and Joe Terry, Economic SAFE Status Report for Groundfish Fisheries Off Alaska, 2000. NPFMC, November 2001. Table 1.

[88] Terry Hiatt, Ron Felthoven and Joe Terry, Economic SAFE Status Report for Groundfish Fisheries Off Alaska, 2000. NPFMC, November 2001. Table 14.

the GOA, over 76,000 mt of pollock was caught in 2000.[89] The *ex-vessel* value of pollock was approximately $256 million, all regions combined, accounting for 45% of total ex-vessel value of groundfish in 2000.[90,91] The Bering Sea accounted for nearly all of the pollock ex-vessel value ($235 million), the remainder coming from the Gulf of Alaska ($20.8 million).

Although pollock yields have remained high throughout the period of U.S. management under the Magnuson-Stevens Act FMPs, intense spatial and temporal concentration of the pollock fisheries has been accompanied by a disturbing pattern of declines indicative of serial depletion. Episodes of intense pulse fishing on spawning stocks in the Shelikof Strait (1981-1985), Bogoslof/Aleutian Basin (1987-1992) and Aleutian Islands (1990s) have been followed by sharp declines in pollock abundance in each of those regions, as noted in successive National Marine Fisheries Service (NMFS) Biological Opinions.

Even the health of the eastern Bering Sea stock remains very much in question, despite apparently strong recruitment from the 1996 year-class in recent years. Had the 1996 year-class not appeared as hoped, the largest fishery in the United States would now be in a state of collapse. If the 1996 year-class proves to be less robust than currently estimated, the fishery could collapse. Furthermore, the Russian Navarin pollock fishery is targeting the same stock of fish, with unknown effects on subsequent recruitment to the spawning grounds on the eastern Bering Sea shelf. The model-projected spawning biomass for the Gulf of Alaska pollock is estimated to be only 26% of its equilibrium unfished biomass, well below the maximum sustainable yield reference level. Declining stocks, recruitment-driven fisheries, reliance on single year-classes, and profound uncertainties about stock structure all raise serious doubts about claims for sustainable single-species management.

These concerns are greatly amplified when the direct, indirect, and cumulative effects on pollock predators are considered in an ecosystem context. All evidence indicates that predation on pollock by marine mammals, many seabirds, and many fishes in the North Pacific is extensive. At least fifteen species of marine mammals, thirteen species of seabirds, and ten fish species are known or believed to feed on pollock at either juvenile or adult phases of pollock's life history. NMFS has even characterized juvenile pollock as the dominant fish prey in the eastern Bering Sea.[92]

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[89] Terry Hiatt, Ron Felthoven and Joe Terry, Economic SAFE Status Report for Groundfish Fisheries Off Alaska, 2000. NPFMC, November 2001. Table 14

[90] Terry Hiatt, Ron Felthoven and Joe Terry, Economic SAFE Status Report for Groundfish Fisheries Off Alaska, 2000. NPFMC, November 2001. Table 21.

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[91] Pollock roe represented only 4.7% of total pollock product produced (16,000 mt out of 342,580 mt) yet represented 36% of total value of product produced – explained by the fact that roe sold for $7-9/lb, far and away the most valuable pollock product in the fishery.

[92] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 3.

Despite the clear importance of pollock to the North Pacific food web, NMFS has never adequately evaluated and addressed the comprehensive effects of the fisheries on the marine ecosystems of the eastern Bering Sea, Aleutian Islands and Gulf of Alaska. In 1998 and 2000, however, NMFS concluded that the pollock fisheries jeopardize the survival and recovery of the endangered western population of Steller sea lions and adversely modify sea lion critical habitat. Despite ongoing litigation under the Endangered Species Act and successive attempts to develop a mitigation plan, the fisheries continue to concentrate catches preferentially in sea lion critical habitat and are currently operating under emergency interim rules that expire in June 2002. Steller sea lions are not the only pollock predator that has declined in the region that the pollock fisheries operate; northern fur seals, harbor seals, and some seabirds are also experiencing significant declines.

The current regulations and level of pollock fishing does not provide adequate security against the risk of overfishing in a single-species context and does not address impacts to the food web in an ecosystem context. The recommended fishing levels and regulations fail to adequately address the following key issues:

- Reliance on a few strong year classes of pollock in setting ABC and TAC levels
- Lack of consideration of uncertainties and unknown information in stock assessments and setting ABC and TAC levels
- Failure to address the needs of pollock predators in the ecosystem in setting ABC and TAC levels
- Large uncertainties about stock structure and stock rebuilding
- A pattern of serial depletion in regional pollock stocks
- Unresolved and unaddressed concerns regarding the Russian fishery in the Navarin Region of the Bering Sea
- Spatial and temporal compression of the pollock fisheries
- Failure to define overfishing in the ecosystem context
- Bycatch and discards of the pollock fisheries
- Excess capacity and overcapitalization of the pollock fleet
- Complying with the Endangered Species Act
- Complying with the National Environmental Policy Act

I. INTRODUCTION

In January 2001, the At-sea Processors Association (APA) applied to the Marine Stewardship Council (MSC) for sustainability certification of the Eastern Bering Sea pollock fishery. APA subsequently enlarged the scope of its request for certification to all Alaska pollock stocks, including the Bering Sea, Aleutian Islands and Gulf of Alaska. APA contracted with Scientific Certification Systems (SCS) to conduct the certification review against the MSC's principles and critiera. SCS is now accepting comments from stakeholders regarding the pollock fisheries.

SCS should not recommend the Alaska pollock fisheries for MSC sustainability certification. First, these controversial fisheries have been the subject of ongoing litigation for their impact on the endangered western population of Steller sea lions and the North Pacific ecosystem. The National Marine Fisheries Service has found that the pollock fisheries are jeopardizing the continued existence of Steller sea lions and adversely modifying their critical habitat. In addition, the federal district court has found NMFS in violation of the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA). Outstanding legal disputes remain regarding the inadequacy of measures imposed against the pollock fisheries to recover the Steller sea lion population that will be heard by the court this summer. Also, the agency is in the process of comprehensively reviewing the environmental impacts of the groundfish fisheries, including the pollock fisheries which are the largest and most significant component of the groundfish fisheries. This review is expected to be complete by the end of 2003.

The management of these fisheries has been and continues to be in a state of severe flux and currently, there is no stable management system in place. Since 1998, the management of the groundfish fisheries has occurred frequently by emergency rules, driven by changes required as a result of the sea lion litigation. In effect, the Council and NMFS have been operating by crisis management.

As demonstrated by the comments below, there are significant problems with the Alaska pollock fisheries and the managing bodies that are charged with regulating the impacts of these fisheries on the ecosystem. These problems regard each of the three MSC sustainability principles – population dynamics, ecosystem impacts and management effectiveness.

The following comments provide both factual background about the Alaska pollock fisheries, as well as addressing concerns and implications of the fisheries. Section II provides a brief background of the MSC Principles and Criteria for Sustainable Fishing. Section III outlines the historical background of the Alaska pollock fisheries. Section IV discusses the biological characteristics of Alaska pollock, including average age, length and weight, spawning and fedundity and the effects of fishing-induced changes in age structure of pollock on size and egg-bearing potential and geographical distribution. Section V addresses the current stock status for the Gulf of Alaska, Eastern Bering Sea, Aleutian Islands, Bogoslof Island/Aleutian Basin, and the Russian Navarin Basin pollock stocks. Section VI discusses the spatial temporal concentration of the pollock fisheries in the Bering Sea, Aleutian Islands and the Gulf of Alaska. Section VII outlines the uncertainties in the total allowable catch (TAC) setting process. Section VIII discusses overfishing, focusing on the shortcomings of the maximum sustainable yield (MSY) based harvest policy, the lack of a legal minimum stock size threshold (MSST) and the problem of the "sliding baseline" syndrome. Section IX emphasizes the importance of pollock in the North Pacific food web, discussing the impacts of the fisheries on marine mammals and seabirds. Section X addresses the limitations of bycatch regulations and the pollock fisheries. Finally, Section XI discusses NMFS mismanagement as demonstrated by the Steller sea lion litigation.

In sum, these comments conclude that the Alaska pollock fisheries do not meet the MSC Principles and Criteria for Sustainable Fishing and should not be certified.

II. BRIEF BACKGROUND OF THE MSC PRINCIPLES AND CRITERIA FOR SUSTAINABLE FISHING

The Marine Stewardship Council (MSC) is an independent non-profit organization that uses market-based incentive to encourage sustainable commercial fishing practices. Being awarded sustainability certification enables a fishery to use the MSC label on its products, stating that the labeled product is the "best environmental choice in seafood." The certification and MSC label signals to consumers that they are purchasing sustainable products and thus through their purchase are rewarding fisheries for their conservation and sustainable practices.

1. Summary of MSC Principles

At the center of the MSC process is a set of Principles and Criteria for Sustainable Fishing which is used as the standard in a third party, independent and voluntary certification program. There are three general principles that represent the philosophical basis for designating a fishery as sustainable. "These Principles reflect a recognition that a sustainable fishery should be based upon:

- The maintenance and re-establishment of healthy populations of targeted species;
- The maintenance and the integrity of ecosystems;
- The development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects; and compliance with relevant local and national laws and standards and international understandings and agreements." (*The MSC Standard,* www.msc.org).

Each principle has a number of associated criteria that describe more specifically the requisite parameters, forming the basis for the evaluating the subject fishery. From the generic Principles and Criteria, the independent certifier develops "performance indicators and scoring guidelines" specific to the fisheries being considered for certification, against which the fishery will be evaluated and scored. To be certified, a fishery must demonstrate that it meets each of the principles by scoring 80 or above, but does not have to meet all of the associated criteria or performance indicators.

In January of 2001, the At-sea Processors Association (APA), a cooperative association of U.S.-flagged catcher/processor vessels (also known as factory trawlers) announced its decision to seek sustainability certification for the United States Eastern Bering Sea pollock fishery under the MSC standard. Subsequently, APA expanded the scope of the review to all pollock fisheries in Alaska, including the Eastern Bering Sea, Aleutian Islands, and Gulf of Alaska stocks.

2. Principles and Criteria for certification as they relate to the Alaska pollock fisheries

2.1 MSC Principle 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

MSC Criterion 1

The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.

Performance Indicators associated with MSC Criterion 1

PI 1.1.1.1: The harvest control rule is well defined.
PI 1.1.1.2: The harvest control rule is based on appropriate limits to the maximum exploitation rate.
PI 1.1.1.3: The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes.
PI 1.1.1.4: The harvest control rule results in reductions in ABCs as uncertainty increases.
PI 1.1.1.5: The harvest strategy can be shown to be precautionary.
PI 1.1.1.6: The harvest strategy is properly applied.
PI 1.1.2.1: Current stock sizes are assessed to be above appropriate limit reference points.

PI 1.1.2.2: Current exploitation rates are below appropriate limit reference points.
PI 1.1.2.3.1: Assessment models are appropriate to the biology of the stock and the nature of the fishery.
PI 1.1.2.3.2: Stock assessment methods are statistically rigorous.
PI 1.1.2.3.3: Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.
PI 1.1.2.3.4.1: There is knowledge of the identity of the target species.
PI 1.1.2.3.4.2: There is knowledge of the identity of stocks in the management area of the fishery.
PI 1.1.2.3.4.3: There is knowledge of the life history characteristics of the species/stocks.
PI 1.1.2.3.4.4: There is knowledge of the behavior (movement, migration, feeding, reproduction) of the stocks.
PI 1.1.2.3.4.5: There is information necessary to measure trends in abundance of stocks.
PI 1.1.2.3.4.6: There is knowledge of environmental influences on stock dynamics.
PI 1.1.2.3.5.1: All major sources of fishing mortality for the stocks are measured and accounted for.
PI 1.1.2.3.5.2: The age and/or size structure of catches are measured.
PI 1.1.2.3.5.3: Fishing methods and patterns are well understood and recorded.
PI 1.2.1: There is formal and comprehensive monitoring of catches of by-product species in this fishery.
PI 1.2.2: There are assessments of significant by-product species.
PI 1.2.3: There are strategies to control catches of significant by-product species in the pollock fishery.

MSC Criterion 2

Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

Performance Indicators associated with MSC Criterion 2

PI 2.1.1: Rules for setting TACs at low stock sizes promote recovery within reasonable time frames.
PI 2.1.2.1: There is a specific recovery plan in place including measures other than TAC reductions.

MSC Criterion 3

Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

Performance Indicators associated with MSC Criterion 3

PI 3.1.1: THE AGE, SEX AND GENETIC STRUCTURE OF THE STOCKS ARE MONITORED.
PI 3.1.2: There is knowledge of the dynamics of sex structure in the species.
PI 3.1.3: Information from stock assessment does not indicate problems with reproductive capacity (spawning stock and recruitment).

2.2 MSC Principle 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

MSC Criterion 1

The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

Performance Indicators associated with MSC Criterion 1

PI 1.1: There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.
PI 1.2.1: Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.
PI 1.2.2: Assessments are conducted to identify and estimate impacts on invertebrate or vertebrate biodiversity and community structure
PI 1.2.3: Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.

PI 1.2.4: There are monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats.
PI 1.3.1: Abundance and/or productivity of animals have been monitored over time such that the fishery can be managed taking into account both natural and fishery impacts on animal abundance
PI 1.3.2: Communities of animals in the habitats likely to be affected by the fishery are known.
PI 1.3.3: Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.

MSC Criterion 2

The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species.

Performance Indicators associated with MSC Criterion 2

PI 2.1: The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.
PI 2.2.1: The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act

PI 2.2.2: Management of the fishery includes provisions for acquiring, integrating and synthesizing new scientific information from protected species research, management and recovery programs outside fishery management.
PI 2.3.1: Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.
PI 2.3.2: Permitted take levels for endangered and threatened species, and threshold levels of unacceptable impact have been identified for protected or icon species in fished areas and the fishery is managed in accordance with national and/or international laws on endangered and threatened species. Threshold levels of unacceptable impact have been identified for habitats in fished areas.
PI 2.3.3: Research is carried out to allow impacts of the fishery on endangered, threatened, protected and icon species to be identified and measured.

PI 2.3.4: There are monitoring programs to assess fishery impacts on endangered, threatened, protected or icon species that have been identified as vulnerable to fishing impacts.
PI 2.4.1: Functional relationships involving endangered, threatened, protected or icon species are adequately understood for the purposes of minimizing the fishery's impacts on such species.
PI 2.4.2: Trophic (predator-prey) relationships, especially those involving endangered, threatened, protected or icon species, are adequately understood for the purposes of minimizing the fishery's impacts on such trophic relationships.
PI 2.4.3: Population sizes and population trends of endangered, threatened, protected or icon species are adequately known, together with the nature and distributions of their essential habitats.

MSC Criterion 3

Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

Performance Indicators associated with MSC Criterion 3

PI 3.1.1: Management strategies include provision for restrictions to the fishery to enable recovery of populations of impacted species that have been depleted by previous actions of this fishery.
PI 3.1.2: Changes in management have been implemented in order to recover affected communities of animals, habitats, or populations of impacted species that are believed to have been depleted by previous actions of this fishery.
PI 3.1.3: There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.

2.3 MSC Principle 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

SCS Criterion 1

The management system has a clearly defined scope capable of achieving MSC Principles and Criteria and includes short and long-term objectives, including objectives for managing ecological impacts of fishing, consistent with a well managed fishery. [This criterion and those that follow are intended to assess the match between the BSAI/GOA pollock fisheries management systems and the terms and intentions of the MSC Principles and Criteria, particularly as understood in the context of the complete text of the Airlie House Draft. As used throughout, the term "management system" is used broadly to include both governmental and private sector components. Governmental components include all applicable governmental systems, not merely the direct regulatory function of a single agency or statute. The judicial system is intended to be considered part of the "management system." Private sector components include the fishing industry itself.]

Performance Indicators associated with SCS Criterion 1

PI 1.1: The management system incorporates and applies an adaptive and precautionary exploited stock strategy [Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]
PI 1.2: The management system incorporates and applies an effective strategy to manage ecological impacts of fishing [Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]
PI 1.3: The management system incorporates and applies an effective strategy to manage the socioeconomic impacts of the fishery [Relates to MSC Criteria 3.2, 3.4, 3.6, 3.7]
PI 1.4.1: There is a research strategy to support the harvest strategy and to address information needed to support the identification and mitigation of ecosystem impacts [Relates to MSC Criterion 3. 8]

SCS Criterion 2

The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral, and explicit basis

Performance Indicators associated with SCS Criterion 2

PI 2.1: The fishery is managed and conducted in a manner that respects international conventions and agreements and not under any controversial unilateral exemption to an international agreement [Relates to MSC Criterion 3.1]
PI 2.2: The fishery is managed and conducted in a manner that respects domestic law [Relates to MSC Criterion 3.16]
PI 2.3: The fishery is managed or conducted in a manner that observes legal and customary rights [Relates to MSC Criterion 3.4]

SCS Criterion 3

The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic, and institutional information.

Performance Indicators associated with SCS Criterion 3

PI 3.1: The management system solicits and takes account of relevant information [Relates to MSC Criterion 3.2]
PI 3.2: The management system involves all categories of stakeholders appropriately on a regular, integral, explicit basis [Relates to MSC Criterion 3.2]
PI 3.3: The management system assesses relevant information pursuant to objective, fair, equitable processes. [Relates to MSC Criterion 3.2]
PI 3.4: The management system provides for timely and fair resolution of disagreements [Relates to MSC Criteria 3.2, 3.5]
PI 3.5: The management system presents managers with clear, useful, relevant information, including advice [Relates to MSC Criterion 3.2]

SCS Criterion 4

The management system applies information through implementation of measures and strategies (by rule or by voluntary action of fishery) that demonstrably control the degree of exploitation of the resource in the light of the natural variation in ecosystems

Performance Indicators associated with SCS Criterion 4

PI 4.1.1: Catch levels are set to maintain high productivity of the target population and the ecosystem [Relates to MSC Criterion 3.10]
PI 4.1.2: Restricts gear and practices to avoid catch of non-target species, minimize mortality of this catch, and reduce unproductive use of non-target species that cannot be released alive [Relates to MSC Criterion 3.12]

PI 4.1.3: Accounts for catch of non-target species [Relates to MSC Criteria 3.10, 3.17]
PI 4.1.4: Minimizes adverse impacts on habitat [Relates to MSC Criteria 3.10, 3.13]
PI 4.1.5: Does not use destructive fishery practices [Relates to MSC Criterion 3.14]
PI 4.1.6: Provides for rebuilding and recovery, where applicable [Relates to MSC Criterion 3.10]
PI 4.1.7: Applies closures or restrictions when catch limits reached [Relates to MSC Criterion 3.10]
PI 4.1.8: Incorporates no-take zones, and MPAs, or other mechanisms, where appropriate to achieve harvest limits and ecosystem protection objectives [Relates to MSC Criterion 3.10]
PI 4.1.9: Minimizes operational waste [Relates to MSC Criterion 3.15]
PI 4.2: The management system provides for compliance [Relates to MSC Criteria 3.11, 3.16]
PI 4.3: The management system provides for monitoring [Relates to MSC Criterion 3.10, 3.11, 3.17]

SCS Criterion 5

The performance of the management system is regularly and candidly evaluated and adapted as needed to improve

Performance Indicators associated with SCS Criterion 5

PI 5.1: The management system provides for internal assessment and review [Relates to MSC Criterion 3.3]

PI 5.2: The management system provides for external assessment and review [Relates to MSC Criterion 3.2, 3.3]
PI 5.3: The management system includes guidelines for responding to assessment outcomes [Relates to MSC Criteria 3.3, 3.7]
PI 5.4: The management system identifies research needs and directs appropriate funding and other resources [Relates to MSC Criteria 3.3, 3.7]

3. Summary of Application of the MSC Principles to the Alaska Pollock Fisheries

3.1 The Alaska Pollock Fisheries Fail to Comply with Principle 1.

The intent of Principle 1 is "to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favor of short-term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yield over the long term." (*The MSC Standard,* www.msc.org).

The Alaska pollock fisheries do not meet either the intent of this Principle, or the Criteria and Performance Indicators that further define it. Abundance levels of pollock stocks in the North Pacific have declined and continue to decline in many areas. Even the eastern Bering Sea pollock stock, which is considered "healthy" is at half of the equilibrium unfished values. The stock assessments fail to adequately consider the vast uncertainties and unknown information which end up compounding the risk of errors in calculating acceptable biological catch (ABC) and total allowable catch (TAC) levels. In addition, fishing has led to alteration of the age structure and geographic distribution of the stocks. Furthermore, the North Pacific overfishing definition is not responsive enough to insure that overfishing will not occur. These issues contribute to the precarious nature of the pollock fisheries and the concern that rather than retaining the stocks' capacity for long-term yields, instead they are vulnerable to a crash, as is seen already in some of the stocks.

3.2 The Alaska Pollock Fisheries Fail to Comply with Principle 2.

The intent of Principle 2 is "to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem." (The MSC Standard, www.msc.org).

The Alaska pollock fisheries fail to meet the intent of this Principle and the Criteria and Performance Indicators that are associated with it. Despite the massive removal of pollock biomass from the North Pacific, NMFS has failed to manage these fisheries from an ecosystem perspective and does not proactively avoid or even address the impacts of the fisheries on the Bering Sea, Aleutian Islands and Gulf of Alaska environment. Instead the agency employs single species management of the target stocks, justifying the catch levels on the notion that the fisheries are catching "surplus pollock" which otherwise would be wasted. NMFS has failed to consider pollock's pivotal role in the marine food web in setting ABC and TAC levels for the fisheries.

Only when forced by a court of law has the agency attempted to take any management steps to curb the pollock fisheries' impacts on the endangered Steller sea lions. Moreover, many of these reactionary management actions have been found to be legally insufficient. Until the agency manages the pollock fisheries with the ecosystem in mind by greatly reducing catch levels to ensure that pollock biomass remains in the marine environment for other consumers, the Alaska pollock fisheries will continue to be prosecuted in a manner that is not sustainable for the North Pacific marine ecosystems.

3.3 The Alaska Pollock Fisheries Fail to Comply with Principle 3.

The intent of Principle 3 is "to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery." (The MSC Standard, www.msc.org).

The Alaska pollock fisheries fail to meet the intent of this Principle because the North Pacific Fisheries Management Council and the National Marine Fisheries Service do not have an operational framework for ensuring that the pollock stock populations are sustainable and that the pollock fisheries do not adversely impact the Bering Sea, Aleutian Islands and Gulf of Alaska ecosystems. Both the Council and NMFS have a history of acting to mitigate the effects of the pollock fisheries primarily when forced by the federal district court through litigation. In over a decade, there has been no stable management of these fisheries because successive FMP amendments have failed to address the root problems in the fisheries. In the last two years, the fisheries have operated under emergency rules and Congressional riders following industry outcry over recommended management changes spurred by court decisions.

The Council and NMFS have disregarded the advice of NMFS' marine mammal scientists in reversing the decline of endangered Steller sea lions and curbing the impacts of the fisheries on other declining species. NMFS itself has determined that pollock is one of three fisheries jeopardizing the continued existence of Steller sea lions and adversely modifying its critical habitat.

In the course of the ongoing litigation against NMFS to protect Steller sea lions from the adverse impacts of the pollock fisheries, the agency has been found repeatedly to be violating the Endangered Species Act and the National Environmental Policy Act (NEPA). Those violations continue as the two most recent biological opinions on the effects of the fisheries on sea lions are being challenged in court and the agency is authorizing the groundfish fisheries in the absence of a legally sufficient programmatic environmental impact statement.

III. HISTORICAL BACKGROUND OF THE ALASKA POLLOCK FISHERIES

Since the arrival of the distant water factory trawlers of Japan and the Soviet Union in the late 1950s and 1960s, approximately 67 million metric tons or nearly 150 billion pounds of pollock, yellowfin sole, rockfish, Pacific cod, Greenland turbot, rock sole, other flatfish, squid and "other species" (not including halibut, salmon, herring, crab and shrimp) have been reported as catches from the eastern Bering Sea, west-central Gulf of Alaska and Aleutian Islands ecosystems.[93] Groundfish catches from the Bering Sea soared from 12,500 tons in the early 1950s to over 2.2 million tons in the early 1970s.[94]

As early as 1961 the United States expressed concern about Japan's rapidly escalating groundfish trawl operations in the eastern Bering Sea and the status of the halibut resource.[95] Serial overfishing and depletion of Bering Sea pollock stocks along with other species accompanied development and expansion of the fishery from the early 1960s through the mid-1970s, a fact noted by U.S. scientists in annual reports to the International North Pacific Fishery Commission (INPFC) during the mid-1970s. A 1974 statement to the INPFC expressed dismay at the depleted condition of pollock and most major groundfish stocks and herring in the eastern Bering Sea:

> "Examination of the Report of the Sub-Committee on Bering Sea Groundfish has clearly indicated to the U.S. the depleted condition of most major groundfish stocks and herring in the eastern Bering Sea. In this situation, the Commission has responsibility to recommend stringent conservation measures.
>
> *The total all-nation catch of Alaska pollock has increased more than tenfold since 1964 to a total of nearly 1.8 million metric tons in 1972. Japan accounted for about 90% of that total. We have noted declining CPUEs in all major fishing areas and a continued expansion of the fishing grounds as the Japanese fishermen have attempted to maintain their catch. Among other signs pointing to deterioration of this resource . . . we have noted that our scientists have agreed that the increasing removals of vast quantities of small pollock which have*

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[93] NPFMC BS/AI Groundfish SAFE Report as Projected for 2001, November 2000, Table 3, NPFMC GOA Groundfish SAFE Report as Projected for 2001, November 2000, Table 5; *See also* NMFS 2001 Draft PSEIS 2.7, Tables 1,2,3 for catch statistics through 1999.

[94] Lowry, L. F., D. G. Calkins, G. L. Swartzman, and S. Hill. 1982. Feeding habits, food requirements and status of Bering Sea marine mammals. Document submitted to North Pacific Fisheries Management Council, Nov. 1, 1982, p. 148.

[95] Fredin, R.A. 1987. History of Regulation of Alaskan Groundfish Fisheries. NWAFC Processed Report 87-07.

> *resulted from the tremendous expansion in this fishery, could lead to an increased worsening in stock conditions."*[96]

U.S. scientists cited as a particularly acute problem the technique of high-volume "pulse fishing," leading to serial depletion of fish stocks:

> *"It seems to us that Japanese fishermen continue to conduct a "pulse" fishery in the northeast Pacific. We have experienced this phenomenon with both Japanese and Soviet fisheries over the past 10 years as their vessels moved into an area, fished it intensively for a few years, then moved on. . . . The only forecast we can make of this situation is that Japanese fishermen will move from species to species and stock to stock, while our scientists are kept busy documenting their successive demise as they now are documenting the decline of the Pacific ocean perch*." [97]

Anger at the practices of the distant water factory ships spurred the passage of the federal Magnuson Fisheries Conservation and Management Act of 1976 and extension of the U.S. Exclusive Economic Zone (EEZ) from twelve nautical miles (nm) to 200 nm. However, total removals in today's U.S.-managed groundfish fishery are not appreciably different from the catch levels of the foreign fishery, although yields from individual species or stock complexes have changed over time as the fishery has shifted from one target species or stock to another.

Under U.S. management authority since 1977, but not fully "Americanized" until the late 1980s, these fisheries have continued to remove approximately two million metric tons of groundfish every year, dominated by the giant eastern Bering Sea pollock fishery. Since the early 1980s, however, major pollock stocks in the Gulf of Alaska (1981-1985), Bogoslof/Aleutian Basin region (1987-1992), and Aleutian Islands (1990s) have declined to the lowest levels in the history of the surveys for those stocks, following intense fisheries on spawning aggregations. In the Gulf of Alaska, pollock is currently below the target stock biomass levels.[98]

Since the 1960s, a reported total of 55.4 million mt or more than 120 billion pounds of groundfish and other species have been taken out of the eastern Bering Sea ecosystem, dominated by pollock removals.[99] The EBS pollock fishery began in earnest in 1964 and from 1964 to 2000, more than 40.7 million metric tons of pollock were extracted from the region. From 1977-1998, another 1.13 million mt of pollock were removed from the Aleutian Islands.[100] In total, nearly 42 million mt of pollock or more than 92 billion pounds, representing nearly 75% of all groundfish catches were reported as catch for this period, although those statistics do not include estimates of unwanted pollock

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[96] International North Pacific Fishery Commission Annual Report, 1974. See United States statement on stocks other than halibut in the eastern Bering Sea.
[97] International North Pacific Fishery Commission Annual Report, 1974. See United States statement on Total Effort on the Convention Area, 1974.
[98] NOAA/NMFS. Our Living Oceans, Report on the Status of U.S. Living Marine Resources, 1999, Tables 19-2 and 19-3, pp. 203 and 204.
[99] NPFMC BS/AI Groundfish SAFE Report as Projected for 2001, November 2000, Table 3; *See also* NMFS 2001 Draft PSEIS 2.7, Tables 1,2,3 for catch statistics through 1999.
[100] NPFMC BS/AI Groundfish SAFE Report as Projected for 2001, November 2000, Table 3.

bycatch (e.g., juvenile fish) prior to 1990. It is important to note that these numbers do not account for the peripheral and cumulative effects of the fisheries, including habitat damages, disturbance effects, incidental catch of marine mammals and seabirds, ghostfishing of lost gear, and dumping of processing wastes.

In the Gulf of Alaska, a total of nearly 7.8 million mt of groundfish and "other species" were recorded as catch from 1960 to 2000. (Appendix I, Table 3).[101] Pollock catches totaled 3.2 million mt (41% of all groundfish caught in the GOA) during 1964-2000, most of it recorded after 1980. It is important to recognize that due to the lower percentage of observer coverage of the GOA groundfish fleet historically compared to the Bering Sea, these numbers probably understate total catches by a large margin. Also, these numbers do not include the peripheral and cumulative effects of the fisheries, including habitat damages, disturbance effects, incidental catch of marine mammals and seabirds, ghostfishing of lost gear, and dumping of processing wastes.

The massive removal of biomass by the pollock fleet and the drastic declines that followed the advent of industrial scale trawling have fueled speculation and controversy about the relationship between the fisheries and the declines of marine mammals and some piscivorous seabirds. Biomass removals and associated impacts to the environment of this magnitude should be considered significant and raise the question whether the limits of sustainability have been exceeded in the North Pacific. The answer to that question depends a great deal on the definition of sustainability, and the appropriate management response depends on the degree of precaution required for action in the face of uncertainty. Presently science can neither disprove the hypothesis that fishing is a major factor in the observed changes in the North Pacific that have occurred since the factory fisheries first arrived off the Alaska coast, nor disprove the countervailing theory that fishing is insignificant compared to naturally occurring oceanographic conditions that drive ecosystem change. It is indisputable, however, that there are serious problems with the Alaska pollock stocks and that massive declines of species in the Bering Sea, Aleutian Islands and Gulf of Alaska have coincided with the rise of the industrial scale pollock fisheries. The pollock stock assessments indicate that all stocks are at low abundance levels relative to the equilibrium unfished values. Intense spatial and temporal concentration of the pollock fisheries on spawning grounds within Steller sea lion critical habitat has been accompanied by a disturbing pattern of pollock spawning stock declines indicative of serial depletion.

IV. BIOLOGICAL CHARACTERISTICS OF ALASKA POLLOCK

1. Average age of Alaska pollock

Pollock can attain ages of 12-16 years, and some may live considerably longer: "*Strong year-classes of pollock persist in the population in significant numbers until about age 12, and very few pollock survive beyond age 16. The oldest recorded pollock was age 31*."[102] The average age of Alaska pollock, however, was estimated in 1993

[101] NPFMC GOA Groundfish SAFE Report as Projected for 2001, November 2000, Table 5; *See also* NMFS 2001 Draft PSEIS, Sec. 2.7, Tables 1,2,3 for catch statistics through 1999.
[102] BS/AI FMP, June 30,1999, p. 99.

at about 9 years, with the average age of the population fluctuating as year classes of fish move through the population.[103] Although the contemporary fishery tends to target pollock in the range of 5-9 years old, the maturity schedule from the stock assessment model indicates that only about 59-64% of age-5 pollock are mature, approaching full maturity (90%+) at about 6-7 years of age.[104] In the EBS pollock stock assessment, the numbers of age 10+ pollock are all aggregated in one bin in the model estimates of numbers at age, thus it is impossible to determine the maximum ages within the modeled population.[105]

2. Average length and weight of Alaska pollock

Reports from the beginning of the twentieth century reflect that adult pollock could reach lengths of three feet (i.e., 90 cm).[106] However data from the 1980s indicated that pollock rarely attained lengths greater than two feet (60 cm), though some specimens reached lengths of about two and half feet (70-80 cm).[107]

According to the BS/AI FMP (NPFMC 1999), a newly maturing pollock (approximately age 4) averages approximately 16 inches in length (40 cm) and weighs a pound or more.[108] The average 5-year-old pollock is about 18 inches in length (45 cm) and weighs about one and a half pounds (.6-.8 kg).[109] However, length and weight of pollock by age will vary by location, latitudinal gradient, and availability of prey. For instance, past research indicated that pollock in the northwestern Bering Sea and Aleutian Basin appeared to grow more slowly and were smaller at age on average. (Hinckley 1987; BS/AI FMP 1999).

According to Wespestad, the *average* age of pollock taken in the eastern Bering Sea fishery from 1964-1996 was 4.8 years.[110] In today's fishery pollock generally range between 12-22 inches (30-55 cm) and one to two pounds (.5-1 kg),[111] but the bulk of the catch falls within the 18-22 inch (45-55 cm) size range corresponding to age 5-9 fish.

3. Spawning and fecundity (egg production) of Alaska pollock

Peak spawning varies from region to region, generally ranging from February to March or April in the Gulf of Alaska and southeastern Bering Sea, later in the northwestern Bering Sea.[112]

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[103] Vidar G. Wespestad. The Status of Bering Sea Pollock and the Effect of the "Donut Hole" Fishery. Fisheries Vol. 18(3): 18-24 (1993).

[104] BS/AI FMP, June 30,1999, p. 100. Also see: Ianelli et al. 2001, p. 1-10. In: NPFMC, Stock Assessment and Fishery Evaluation (SAFE) Report for the BSAI as Projected for 2002, November 2001.

[105] Ianelli et al. 2001, Table 1.14, p. 1-35. *In:* NPFMC, Stock Assessment and Fishery Evaluation (SAFE) Report for the BSAI as Projected for 2002, November 2001.

[106] D.S. Jordan and B.W. Evermann. American Food and Game Fisheries, A Popular Account of All the Species Found in America North of the Equator. Doubleday, Page and Co., 1902. 572 pp. Page 510: *"It reaches a length of 3 feet and is doubtless a good food-fish, but no important fishery for it has been established."*

[107] Sarah Hinckley, The Reproductive Biology of Walleye Pollock, Theragra chalcogramma, in the Bering Sea, with Reference to Spawning Stock Structure. Fishery Bulletin Vol. 85(3), 1987: 481-498.

[108] BS/AI FMP, June 30,1999, p. 100.

[109] BS/AI FMP, June 30,1999, p. 100.

[110] Vidar G. Wespestad, BSAI Walleye Pollock Assessment for 1996, p. 1-10. In: NPFMC Stock Assessment and Fishery Evaluation as Projected for 1997: "*The average age of pollock in the catch since 1964 is 4.8 years old."*

[111] See BS/AI FMP, June 30,1999, p. 100, for length/weight at age.

[112] BS/AI FMP, June 30, 1999, p. 99.

Depending on location and latitude, spawning may occur any time from early winter to late summer in the Bering Sea (Hinckley 1987):

> *"Observer information showed that walleye pollock spawning in the Bering Sea began in the Aleutian Basin in January. As the year progressed, spawning was observed further inward over the continental slope and shelf. Spawning occurred between January and March in the basin, between March and June over the southeastern Bering Sea slope and shelf, and between June and August over the northwest slope and shelf. Scattered spawning was noted in the northwestern areas as late as October*."[113]

Pollock are batch spawners, meaning that females release eggs every two to three days over a period of about a month.[114] As pollock females age and grow bigger and heavier, their egg-bearing potential increases substantially.[115,116] Research by Hinckley (1987), though limited, indicated that female pollock specimens in the 40-45 cm size range (corresponding to age-4/5 fish) produced roughly 100,000-130,000 eggs per fish, whereas females in the 60 cm size range (perhaps age 10+) produced 500,000-600,000 eggs per fish and females in the 65-75 cm size range produced 1,000,000 eggs or more.[117] These specimens were not aged, the sample sizes were small, and egg production may vary widely from year to year or region to region. Given those caveats, the data suggest that older, bigger pollock can produce anywhere between 5-10 times more eggs than females at early maturity (age 4 or 5).

Studies of egg production in North Atlantic cod also confirm that bigger, older females produce vastly more eggs per fish. In addition, egg production and egg viability appears linked to food quality and availability prior to spawning and perhaps also to the prime habitat utilized by bigger individuals.[118] If the fishes do not obtain adequate forage in the months prior to spawning, for instance, their egg production is likely to be lower.[119]

Female spawning biomass estimates from stock assessments are used as a “proxy” or indicator of viable egg production. However, the models assume constant egg production in age classes of fish and ignore the biological, behavioral and ecological factors that directly

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[113] Sarah Hinckley, The Reproductive Biology of Walleye Pollock, Theragra chalcogramma, in the Bering Sea, with Reference to Spawning Stock Structure. Fishery Bulletin Vol. 85(3), 1987: 481-498.
[114] Sarah Hinckley, Variation of Egg Size of Walleye Pollock, *Theragra chalcogramma*, with a Preliminary Examination of the Effect of Egg Size on Larval Size. Fishery Bulletin 88(3), 1990: 471-483.
[115] Sarah Hinckley, The Reproductive Biology of Walleye Pollock, Theragra chalcogramma, in the Bering Sea, with Reference to Spawning Stock Structure. Fishery Bulletin Vol. 85(3), 1987: 481-498. See pp. 491-493, Figs. 6, 8.
[116] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 11, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock. “There is a 9% increase in eggs/kg body weight for age-15 pollock relative to age-4 pollock.”
[117] Sarah Hinckley, The Reproductive Biology of Walleye Pollock, Theragra chalcogramma, in the Bering Sea, with Reference to Spawning Stock Structure. Fishery Bulletin Vol. 85(3), 1987: 481-498. See pp. 491-493, Fig. 6.
[118] Beth Scott, Gudrun Marteinsdottir, and Peter Wright. Potential effects of maternal factors on spawning stock-recruitment relationships under varying fishing pressure. Can. J. Fish. Aquat. Sci. 56 (1999): 1882-1890.
[119] See: Beth Scott, Gudrun Marteinsdottir, and Peter Wright. Potential effects of maternal factors on spawning stock-recruitment relationships under varying fishing pressure. Can. J. Fish. Aquat. Sci. 56: 1882-1890 (1999); Gudrun Marteinsdottir, Asta Gudmundsdottir, Vilhjalmur Thorsteinsson, and Gunnar Stefansson. Spatial variation in abundance, size composition and viable egg production of spawning cod in Icelandic waters. ICES Journal of Marine Science, 57: 824-830, 2000; C. Tara Marshall, Nathalia A. Yaragina, Yvan Lambert and Olav S. Kjesbu. Total lipid energy as a proxy for total egg production by fish stocks. Nature, Vol. 402, 18 November 1999: 288-290; C. Tara Marshall, Olav Sigurd Kjesbu, Nathalia A. Yaragina, Per Solemdal, and Oyvind Ulltang. Is spawner biomass a sensitive measure of the reproductive and recruitment potential of Northeast Arctic cod? Can. J. Fish. Aquat. Sci. 55: 1766-1783 (1998).

affect egg production from year to year, thus biomass may not be a reliable proxy for egg production or egg viability.

4. Effects of fishing-induced changes in age structure of pollock on size, egg-bearing potential, and geographic distribution

Over time steady fishing pressure changes the age structure of exploited stocks, reducing the average age as well as the average length and weight of pollock populations significantly. This occurs because the fishery selectively and repeatedly targets age-5+ pollock and increases the mortality on those age groups above the natural mortality rate, thus culling the older fish from the population and reducing their abundance substantially (40-60%) over time:

> "The reduction in abundance that occurs as a result of commercial fishing is not uniform across all ages. Direct fishing mortality on juvenile pollock is low and their abundance is only affected by fishing indirectly through the stock-recruitment relationship. . . . For early adult pollock (ages 5-9), which make up the bulk of the catch, mean abundance is reduced by 40-60% from unfished levels due to direct mortality. For the late adults (age 10+), mean abundance is reduced to less than 10% of unfished levels due to the large cumulative mortality since becoming vulnerable to fishing gear."[120]

Evidence from the past suggests that the pollock fishery substantially reduced the average age, size, weight, and abundance of pollock in the Bering Sea in the 1970s (Lowry *et al*. 1988) and in the Gulf of Alaska in the 1980s (Calkins and Goodwin 1988). For instance, Lowry *et al*. (1988) cited fisheries statistics from the 1970s indicating that the intense foreign pollock fishery of the early 1970s rapidly reduced the abundance of older pollock in the Bering Sea, as well as the average size of pollock in the population:

> "Based on cohort analysis, the exploitable biomass (ages 2-9) in the Bering Sea increased in the 1960s, peaked in the early 1970s, then declined in the mid-1970s. Part of the cause of this decline was "the accumulative removals by the fishery in 1970-75 (which totaled 9.6 million t). (Bakkala et al., 1987). The catch-per-unit-effort in the fishery and by research vessels dropped by a factor of more than 3 from the late 1960s to the mid-1970s, and the average length of pollock caught dropped from 42-44 cm to 35 cm (Pereyra et al., 1976). Based on this change in lengths, the projected mean weight of fishes would have declined by about 45%."[121]

The November 2000 Steller sea lion FMP-level Biological Opinion conducted an analysis of fished and unfished populations in the North Pacific using a conventional single-species model and MSY equilibrium assumptions and found that the "average" eastern Bering pollock is more than a year

[120] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 12, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .

[121] Lloyd F. Lowry, Kathryn J. Frost, and Thomas R. Loughlin. Importance of Walleye Pollock in the Diets of Marine Mammals in the Gulf of Alaska and Bering Sea, and Implications for Fishery Management. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, November 1988. Alaska Sea Grant Report 89-1. June 1989.

younger and weighs 30% less under the $F_{40\%}$ exploitation strategy employed by the North Pacific Council.[122] This "juvenation" of the stock over time will have large impacts on egg production:

> "Commercial fishing increases the total mortality of the exploited population, and will result in significant demographic changes, including a reduction in reproductive output. . . . There is a 9% increase in eggs/kg body weight for age-15 pollock relative to age-4 pollock. . . . For an F40% harvest rate, where female spawning biomass per recruit is reduced to 40% of unfished, the egg production per recruit was reduced to 39% of unfished egg production."[123]

This fishing strategy not only changes the age structure and egg-bearing potential of the exploited pollock population over time, it is also likely to change the relative geographic distribution of the pollock stock, reflecting the habitat preferences of younger-aged fish: "Since the late adults are disproportionately reduced in the abundance by fishing, the areas occupied by them would show a far greater decline in mean fish density than areas occupied by younger adults."[124]

Furthermore, these cumulative effects on age structure, size and distribution of exploited pollock stocks should also be expected to have substantial impacts on the other consumers of pollock in the ecosystem:

> "Fishing does, however, reduce the number of spawning fish, and the number of fertilized eggs, larvae, and juvenile fish produced. In an equilibrium single-species context, "recruitment" to the fished population may be unaffected in the long-term by removal of 60% of the female spawning biomass. From this perspective, this was "surplus" production. On the other hand, from the perspective of other predators of fish, a long-term equilibrium reduction in spawners, larvae and juveniles is likely since the "surplus" went to them."[125]

Lowry *et al*. (1988) and Calkins and Goodwin (1988) both suggested that fishing-induced reductions in average age, size as well as overall availability of pollock could have had deleterious impacts on Steller sea lion nutrition. For instance, Calkins and Goodwin (1988) observed that the sizes of pollock eaten by sea lions near Kodiak Island in 1985/86 during the massive but short-lived Shelikof Strait roe pollock fishery were significantly smaller than during 1975-76, when the fishery was just starting to expand. They estimated the average weight of pollock eaten by sea lions in the 1970s to be 148g compared to 93g in the 1980s data.[126] This suggests that sea lions would have to work harder and eat more of the smaller pollock to get the same amount of calories (energy) contained in older, larger fish.

V. CURRENT STOCK STATUS

[122] NMFS November 2000 FMP BiOp, p. 226.
[123] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 11, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .
[124] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 13, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .
[125] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.10, p. 18, re: F40% effects on carrying capacity of predators.
[126] D. Calkins and E. Goodwin. Investigation of the decline of Steller sea lions in the Gulf of Alaska. Final Report to NMFS, NMML Contract No. NA-85-ABH-00029, 1988. 76 pp.

The 2002 pollock stock assessments indicate that all stocks are at low abundance levels relative to the unfished condition and some stocks are depleted and closed to fishing due to low abundance levels. As noted in the North Pacific Stock Assessment and Fishery Evaluation (SAFE) report for 2002, the model-projected spawning biomass for the Gulf of Alaska pollock stock at 158,300 is estimated to be only 26% of its equilibrium unfished biomass, well below the $B_{40\%}$ reference level. The 2002 projected eastern Bering Sea female pollock spawning biomass at 2.964 million metric tons is estimated to be above the $B_{40\%}$ target stock size, but only 45% of the equilibrium unfished value. A pattern of serial depletions has been documented for pollock in Shelikof Strait from 1981 to1985, Bogoslof/Aleutian Basin from 1987 to 1992, and the Aleutian Islands during the 1990s, all within regions of sea lion critical habitat, as noted in the 1998 and 2000 NMFS Biological Opinions. The Bogoslof/Aleutian Basin pollock stock continues to decline and the Aleutian Islands pollock stock remains at low levels relative to estimated stock size at the start of the fishery in the early 1980s. Both of these latter fisheries remain closed to directed fishing due to low abundance.

1. Gulf of Alaska Pollock

1.1 Historical Glimpse

According to available catch statistics, the foreign fishery during the 1960s took only trace amounts of GOA pollock. Pollock catches rose sharply in the early 1970s, ranging from 34,000-86,000 mt between 1972-1976, and reached nearly 118,000 mt in 1977.[127] From 1980-1985, catches soared and 1.239 million metric tons of pollock were taken in the massive Shelikof Strait roe pollock fishery, concentrated on spawning grounds west of Kodiak Island. Despite a nearly 10-fold reduction in Shelikof Strait survey biomass by the late 1980s,[128] Gulf-wide pollock catches ranged from more than 65,000 mt to 88,000 mt during the late 1980s.[129] During the 1990s, biomass remained low compared to the estimates for the early 1980s yet catches totaled 933,000 mt over the decade and averaged 90,000 mt per year, reaching a high of 125,000 mt in 1998.[130] Throughout the entire time period from 1980, the majority of the catch (50-90% per year) was concentrated in Steller sea lion critical habitat

1.2 Recent Status

By the late 1990s, the Shelikof spawning biomass estimate had declined to the low levels of the late-1980s once again. In addition, the 1999 Gulf-wide bottom trawl survey estimate of pollock biomass (611,210 mt) was the lowest in the time series of surveys that began in 1984. The stock assessment model time series of Gulf pollock biomass from 1969 to 2000 indicated that the age 3+ biomass and female spawning biomass had declined steadily to the lowest levels on record by 2000.

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[127] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska for 2002, Table 1.1, p. 1-32. *In*: Gulf of Alaska Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[128] Dorn *et al*. Table 1.5, p. 1-36. Gulf of Alaska Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[129] Dorn *et al*. Table 1.1, p. 1-32.
[130] Dorn *et al*. Table 1.1, p. 1-32.

[131] Gulf pollock spawning biomass for 2001 was projected to be 204,600 tons, well below the model estimate of the $B_{40\%}$ "target" stock size (250,000 tons, the female spawner biomass reference level at an $F_{40\%}$ fishing rate).[132] The "proxy" reference value for B_{MSY} under tier 3 of the overfishing definition is $B_{35\%}$, equal to 218,000 mt of female spawning biomass. Thus the projected 2001 spawning biomass was below both the $B_{40\%}$ *and* the proxy B_{MSY} stock sizes[133]:

GOA pollock spawning biomass reference levels: (based on stock assessment for 2001)[134]	B35%	B40%	B100%
	218,000 mt	250,000 mt	624,000 mt

1.3 2002 Projected Status

The 2001 bottom trawl survey estimate declined 65% from 1999's estimate to only 216,761 mt – a new record low for the time series. As of November 2001, the model-projected spawning biomass for 2002 (158,300 mt) is estimated to be only 26% of its equilibrium unfished biomass, well below the $B_{40\%}$ and $B_{35\%}$ reference levels.[135]

GOA pollock spawning biomass reference levels: (based on stock assessment for 2002)[136]	B35%	B40%	B100%
	214,000 mt	245,000 mt	612,000 mt

Projected 2002 female spawning biomass = 158,000 mt (Dorn et al. 2001).

1.4 2002 ABC Recommendation

Since the pollock stock is projected to be 14% below $B_{40\%}$, the stock falls into sub-tier 3b of the overfishing regulations in the Fishery Management Plan (FMP) and the maximum permissible fishing rate is adjusted downward slightly by multiplying $F_{40\%}$ times the ratio of current spawning biomass to the $B_{40\%}$ target biomass to derive the adjusted $F_{40\%}$ rate ($F_{40\%\ adj}$).

Dorn *et al*. proposed an additional reduction from the maximum permissible $F_{40\%\ adj}$ to retain the buffer built into the overfishing rules. Under these rules, the maximum permissible F_{ABC} harvest rate under Tier 3 ($F_{40\%}$) is 83.5% of the overfishing level fishing rate (F_{OFL}).[137] This 16% buffer is a response to the recommendations of the NMFS national standard overfishing guidelines to treat MSY

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[131] Dorn *et al*. GOA Pollock Stock Assessment, Table 1.10, p. 63. *In*: GOA SAFE Report as Projected for 2001. NPFMC, November 2000.
[132] The $B_{40\%}$ "target" estimate is based on average recruitment for all years (1979-2000), since MSY parameters such as B_{MSY} are unknown for this stock. Dorn et al. (2001), p.1-23.
[133] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 47. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2001. NPFMC, November 2000.
[134] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 47. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2001. NPFMC, November 2000.
[135] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 1-24. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[136] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 1-24. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[137] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 1-25. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.

as a limit rather than a target fishing level, and to set fishing levels at a lower rate to account for uncertainty. In the case of GOA pollock, the 2001 pollock ABC of 100,700 mt was the maximum permissible under Tier 3, i.e., 100% of $F_{40\%}$. However, because the new survey information from 2002 indicates that the stock size is actually much lower than projected in last year's stock assessment model, the maximum 2001 ABC would have resulted in overfishing if the full amount was caught:

> "For Gulf of Alaska pollock, the maximum permissible F_{ABC} harvest rate is 83.5% of the OFL harvest rate. In 2001, the pollock ABC of 100,770 t recommended by the assessment author and the Plan Team was based on the maximum permissible F_{ABC}. Because the new survey information suggested that [the] pollock stock was lower than projected based on last year's stock assessment model, it now appears that had the entire pollock ABC been taken this year the overfishing rate would have been slightly exceeded (Fig. 1.29)."[138]

Actual 2001 pollock catches were expected to be below the 2001 ABC recommendation of 100,700 mt. Preliminary reports indicate that the pollock fleet stopped fishing before reaching the total TAC allowed because adult-sized fish were becoming scarce and it was not profitable to expend the effort required to catch commercially desired adult fish. According to NMFS website, the total pollock catch in the Gulf of Alaska was 68,134 mt.[139]

Although the 16% buffer between OFL and the maximum permissible ABC harvest rate is intended to ensure that the true spawning biomass is at least 83.5% of the estimated spawning biomass in order to prevent accidental overfishing, this buffer diminishes when the spawning biomass drops below $B_{50\%}$.[140] Under the alternative ABC proposed by Dorn *et al*., the buffer between OFL and ABC would have remained constant at 16% at all stock sizes by reducing the $F_{ABC\ adj}$ to a level below the maximum permissible $F_{ABC\ adj}$ in sub-tier 3b of the overfishing FMP overfishing definition:

> "The [16%] safety buffer [between OFL and ABC] becomes smaller at lower spawning biomass. Below $B_{40\%}$, the true spawning biomass cannot be more than about 8% lower than estimated spawning biomass to avoid overfishing (Fig. 1.30). In light of experience in 2001 in recommending an ABC that could have resulted in overfishing, we developed an alternative that maintains a constant buffer between ABC and OFL at all stock levels. While

[138] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 1-24. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.

[139] 2001 Gulf of Alaska Groundfish Quotas and Preliminary Catch in Round Metric Tons
Data are from Weekly Production and Observer Reports through 12/31/01
Quotas are based on Final Specifications

	TOTAL CATCH		REMAINING QUOTA	% QUOTA
West, Cent Pollock				
Pollock 610	30,471	31,056	585	98
Pollock 620	1,742	8,059	6,317	22
Pollock 630	17,026	23,583	6,557	72
Pollock - Shelikof	18,895	18,619	-276	101

The total catch = 68,134 mt Total TAC = 81,317

[140] Dorn *et al*. Draft Assessment of the Walleye Pollock Stock in the Gulf of Alaska for 2002, p. 24. Plan Team November 15, 2001.

> there will always [be] some probability of exceeding F_{OFL} due to imprecise stock assessments, it does not seem reasonable to reduce [the] safety margin as the stock declines."[141]

For Gulf pollock, the resulting 2002 ABC recommendation (53,490 mt) is therefore approximately 16% below the maximum permissible level under sub-tier 3b (64,110 mt). However, the North Pacific Fishery Management Council's Science and Statistical Committee (SSC) rejected this proposed modification of the overfishing regulations in the FMP. Thus the 1002 TAC was set at 100% of the maximum permissible ABC, 58,250 metric tons.

1.5 Ecosystem Considerations at Low Stock Sizes

Although the stock is not deemed "overfished" according to the single-species overfishing criteria in the FMP, the overfishing reference levels provided in the stock assessment advice illustrate that such stock size levels are far below the expected unfished level on average.[142] While today's low spawning stock abundances are arguably consistent with the expectations of an $F_{40\%}$ exploitation strategy, the November 30, 2000 Fishery Management Plan Biological Opinion (FMP BiOp) concludes that such reduced stock sizes can pose a serious competitive threat to competing pollock consumers, in this case the endangered western population of Steller sea lions.[143] If this lower spawner biomass is the expected outcome of fishing at the $F_{40\%}$ rate, such that only 26% of the equilibrium unfished spawning stock size is presently available, that is simply another way of saying that on average there would be about 74% more pollock biomass available in the absence of fishing to support the Gulf of Alaska's endangered Steller sea lion and depleted harbor seal populations, as well as other pollock predators in the ecosystem. There is no surplus in nature.

The index of GOA pollock stock biomass from the annual Shelikof Strait hydroacoustic/trawl surveys has shown a dramatic decline during the twenty-year period of the fishery, approaching the lowest levels ever recorded in the most recent years. (*See* Table 1 below). Whether this nadir is within the range of natural fluctuation between high and low stock sizes, the result of twenty years of steady fishing pressure under an MSY-like strategy, or some combination of both factors, the fact remains that the stock is experiencing a period of record-low biomass in the model time series. At such reduced stock sizes, current fishing levels will amplify downward trends at the very least and increase the chances that such fishing levels will inadvertently crash the stock in the coming years. If environmental conditions for pollock survival and recruitment are poor, the odds of a crash only increase. NMFS has not explicitly assessed the impacts on major pollock predators such as the Steller sea lion of such large declines in spawning stock biomass, and the proposed BiOp RPAs have not addressed the impacts of fishing down spawning stocks under an MSY-based $F_{40\%}$ fishery exploitation strategy, e.g., by reducing the fishing rate and lowering the TAC levels to account for the needs of competing predators such as the Steller sea lion.

[141] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 1-25. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[142] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 47. *In*: GOA SAFE Report as Projected for 2001. NPFMC, November 2000.
[143] For a discussion of the problems with the F40 exploitation strategy, see discussions on Overfishing section below.

Table 1 -- Shelikof Strait Pollock Biomass Estimates and Gulf of Alaska SSL Trend Counts, 1976-2000.			
Year	Shelikof EIT Survey (tons) (1,2)	SSL Nonpups CGOA(3,4)	SSL *Nonpups* WGOA(3,4)
1976		24,678	8,311
1981	2,785,755		
1983	2,278,172		
1984	1,757,168		
1985	1,175,823	19,002	6,275
1986	585,755		
1988	301,709		
1989	290,461	8,552	
1990	374,731		
1991	380,331	7,715	5,341
1992	580,000/ 681,400(2)	7,330	5,502
1993	295,785/ 408,200(2)		
1994	467,300	6,795	5,719
1995	618,300		
1996	745,400	5,751	5,724
1997	570,100		
1998	489,900	4,971	5,855
2000	334,900	4,711	4,577
2001	369,600		

(1) Hollowed et al., 1998. Revised pollock biomass estimates from echo integration trawl surveys of Shelikof Strait, Table 1.4., for years 1981-1993 using Biosonics.

(2) Dorn et al. (2001). Revised pollock biomass estimates from echo integration trawl surveys of Shelikof Strait, Table 1.5, p. 1-36, for years 1992-2001 using Simrad EK500.
(3) NMML/NMFS. Counts of adult and juvenile Steller sea lions observed at rookery and haul-out trend sites during June and July aerial surveys.
(4) NMFS. Steller sea lion survey results, June and July 2000. 8 September 2000, Table 2, for years 1991-2000

2. Bering Sea / Aleutian Islands Pollock Stocks

2.1 Eastern Bering Sea Pollock

2.1.1 Historical Glimpse

A reported total of 55.4 million metric tons (more than 120 billion pounds) of groundfish have been taken out of the eastern Bering Sea ecosystem since the 1960s, dominated by pollock removals.[144] In 1964, the eastern Bering Sea (EBS) pollock fishery began. From 1964-2000, more than 40.7 million metric tons of pollock were extracted from the region. From 1977-1998, another 1.13 million mt of pollock were removed from the Aleutian Islands. In total, nearly 42 million mt of pollock (more than 92 billion pounds, representing nearly 75% of all BSAI groundfish catches) were reported as catch for this period, although those statistics do not include estimates of unwanted pollock bycatch (e.g., juvenile fish) prior to 1990. During the 1990s, Bering Sea pollock continued to support yields above the "historical" average of about 1.1 million mt (2.4 billion pounds) per year in the Bering Sea, and 50-70% of this catch was taken from Steller sea lion critical habitat.

2.1.2 Recent Status

Concerns about the low level of spawning stock biomass and future productivity of the eastern Bering Sea pollock stock loomed large during the latter half of the 1990s. Based on MSY parameters, the Bering Sea / Aleutian Islands (BS/AI) Groundfish Plan Team estimated that the projected 1999 spawning stock was at only 30% of its unfished reference stock size. Consequently, the Plan Team recommended an acceptable biological catch (ABC) below 1 million metric tons for the first time in the 1990s to address their concerns:

> "The Plan Team recognizes that a 1999 ABC of 992,000 t would constitute a reduction of nearly 27% from the maximum value permissible under Amendment 44, but believes that such a reduction is warranted for the following reasons: 1) the 1998 trawl survey biomass estimate is the lowest since 1980 and the second lowest in the entire time series; 2) the future catches and biomass levels will be heavily dependent on the strengths of the 1996 and 1997 year classes, the estimates of which are currently accompanied by high levels of uncertainty; 3) the projected 1999 spawning biomass is only 31% of the estimated pristine level (if no stock-recruitment relationship is assumed); 4) pollock has been the most common item in the diet of Steller sea lions, which are listed as an endangered species; 5) the impacts of Russian harvests of pollock in the western Bering Sea on future recruitment to the eastern Bering Sea stock are currently unknown but potentially significant; 6) the age distribution of the stock is narrower than was the case during the late 1980s and early

[144] NPFMC BS/AI Groundfish SAFE Report as Projected for 2001, November 2000, Table 3.

1990s, raising possible concern about the short-term spawning capacity of the stock; and 7) the harmonic mean of the pdf for F_{MSY} is much higher than expected, raising possible concern about its use as a target harvest rate."[145]

The November 2000 FMP BiOp cited stock assessment information indicating that the EBS pollock stock was 43% of its equilibrium unfished reference level in 1999.[146]

Yet the 2001 EBS pollock acceptable biological catch (ABC) of 1,842,000 metric tons constituted a 62% increase from the 1,139,000 mt ABC for 2000, about 400,000 mt greater than the largest catch in the past 20 years. The 2001 EBS pollock Total Allowable Catch (TAC) of 1.4 million metric tons was the highest since 1990 (1,455,193 mt), not equaled since the height of the foreign fishery in 1970-1975. The increase in ABC was based on the apparent strength of the 1996 year-class, whose actual abundance was uncertain but believed to be above average. The 2000 bottom trawl and hydroacoustic surveys indicated a strong showing of 4-year-old fish, as well as somewhat greater numbers of older pollock from the 1992 year-class. The 2000 Eastern Bering Sea bottom trawl survey estimate of 5.14 million mt was 30% higher than the 1999 bottom trawl survey estimate (3.27 million mt) and the combined bottom trawl/acoustic survey biomass estimate for 2000 (8.19 million mt) was 17% higher than the 6.86 million metric ton biomass estimate of 1999, but not as large as survey abundance estimates in 1979, 1985, or 1988.[147] Despite the modest upswing in stock biomass estimates during the 1999-2000 period, bottom trawl survey biomass trends have declined steadily since the mid-1980s and remain lower than at any time since 1982.[148]

The EBS stock status is of great concern, given the long-term declining trends of associated stocks in the Bering Sea and Aleutian Islands, the large uncertainties about stock structure overall, and reliance on the presumed strength of one incoming year class of young fish in the EBS. From an ecosystem perspective, the stock biomass remains far below the equilibrium (average) unfished levels, yet NMFS provides no adjustment to the single-species fishing level to address the needs of Steller sea lions or the Bering Sea pollock food web as a whole.

2.1.3 2002 Projected Status

Notwithstanding the presumed strength of the 1996 year-class, the 2001 bottom trawl survey biomass estimate of 4.14 million metric tons represented a 20% decline from the 2000 value (5.14 million metric tons).[149] Moreover, the projected 2002 spawning biomass (2.964 million mt) is above the $B_{40\%}$ target level, but is only 45% of the equilibrium unfished value (6.525 million mt, $B_{100\%}$):

<u>EBS pollock spawning biomass reference levels</u>: <u>B35%</u> <u>B40%</u> <u>B100%</u>
(based on stock assessment for 2002)[150]

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[145] Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the BS/AI as Projected for 1999, Summary by the Plan Team. November 1998, p. 7.
[146] NMFS November 2000 FMP BiOp, p. 224.
[147] James Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, Table 1.5, p. 69. *In*: BSAI Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2000. NPFMC, November 1999.
[148] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, Figure 1.8, p. 86. *In*: BSAI SAFE Report as Projected for 2000. NPFMC, November 1999.
[149] Ianelli *et al*. Draft Eastern Bering Sea Walleye Pollock Stock Assessment for 2002, Table 1.6, pp. 29. Plan Team November 14, 2001.
[150] Ianelli *et al*. Draft Eastern Bering Sea Walleye Pollock Stock Assessment for 2002, Table 1.6, pp. 29. Plan Team November 14, 2001.

2.170 mmt 2.610 mmt 6.525 mmt

Projected 2002 female spawning biomass = 2.964 million metric tons[151]

2.1.4 2002 ABC Recommendation

Based on the stock assessment reference model employed by Ianelli *et al*., the maximum permissible 2002 ABC at $F_{40\%}$ under Tier 3 of the overfishing definition equals 2.269 million metric tons, whereas the maximum permissible 2002 ABC at F_{MSY} under Tier 1 (based on the "harmonic mean" value) equals 2.108 million metric tons. The Plan Team was inclined to recommend 2.108 million mt as the 2002 ABC value, which is the highest level ever recommended for this stock in the history of the fishery. However, future recruitment is uncertain and the model predicts that the spawning stock is likely to drop below the $B_{40\%}$ and B_{MSY} "target" under this level of fishing. In addition, the industry leaders argued that they will not catch that much pollock because (1) they would exceed the 2 million metric ton cap on groundfish catches in the Bering Sea, and (2) they would be unable to catch other desired target species. Thus the stock assessment author recommended that the TAC should be set far below the ABC to 1.4 million mt, which is what the Bering Sea pollock industry wanted:

> "FOR THE YEAR 2002, MAXIMUM PERMISSIBLE ABC ALTERNATIVES BASED ON THE F40% AND HARMONIC-MEAN F_{MSY} ARE 2,269 AND 2,108 THOUSAND TONS, RESPECTIVELY, FOR THE REFERENCE MODEL (F_{MSY} HARVESTS BASED ON THE HARMONIC MEAN VALUE) AS SHOWN IN TABLE 1.13 FOR MODEL 1. HOWEVER, SUBSEQUENT RECRUITMENT HAS BEEN BELOW AVERAGE (THOUGH IS [SIC] HIGHLY UNCERTAIN). HENCE, SHORT-TERM PROJECTIONS (SHOWN BELOW) PREDICT THAT THE SPAWNING STOCK IS LIKELY TO DROP BELOW THE $B_{40\%}$ AND B_{MSY} LEVELS. WHILE WE FEEL THERE IS NOTHING INTRINSICALLY WRONG WITH HAVING THE POPULATION DROP BELOW IT'S [SIC] OPTIMAL LEVEL (SINCE UNDER PERFECT MANAGEMENT, IT IS EXPECTED TO BE BELOW THE TARGET EXACTLY HALF THE TIME), CHOOSING A HARVEST LEVEL THAT REDUCES THIS LIKELIHOOD MIGHT 1) PROVIDE STABILITY TO THE FISHERY; 2) PROVIDE ADDED CONSERVATION GIVEN THE CURRENT STELLER SEA LION POPULATION DECLINES; AND 3) PROVIDE ADDED CONSERVATION DUE TO UNKNOWN STOCK REMOVALS IN RUSSIAN WATERS. WE THEREFORE CONSIDER IT PRUDENT TO RECOMMEND A HARVEST LEVEL LOWER THAN THE MAXIMUM PERMISSIBLE VALUES. AS AN EXAMPLE, UNDER CONSTANT CATCH SCENARIOS OF 1.4 AND 1.3 MILLION TONS, THE STOCK IS EXPECTED TO REMAIN WELL ABOVE THE $B_{40\%}$ LEVEL (FIG. 1.45)."[152]

A 2002 TAC level of 1.4 million mt of pollock would be 36% below the maximum permissible ABC of 2.1 million mt, which appears to be highly conservative. However, no one has ever caught 2.1 million mt of pollock in a year, and no one has ever proposed that such a level of fishing is sustainable in the long-term. It is highly questionable that such a level of fishing makes any sense when spawning biomass is estimated to be only 45% of the equilibrium unfished stock size ($B_{100\%}$). This ambivalence was apparent in the Plan Team deliberations, but not explicitly discussed.

2.1.5 Ecosystem Considerations at Low Stock Sizes

Single species ABC-setting fails to explicitly address the needs of pollock consumers in the , although hoc deliberate conservatism in setting ABC levels results in reductions in total fishing mortality from the maximum permissible. Predation on pollock by marine mammals, seabirds, and many fishes in the North Pacific is extensive. As noted in the Draft Programmatic SEIS (NMFS 2001), "juvenile pollock is the dominant fish prey in the eastern Bering Sea."[153] Steller sea lions, northern fur seals, harbor seals, spotted and ringed seals, and various cetaceans all consume significant amounts

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151 Ianelli *et al*. Draft Eastern Bering Sea Walleye Pollock Stock Assessment for 2002, Table 1.6, pp. 29. Plan Team November 14, 2001.
152 Ianelli *et al*. Draft Eastern Bering Sea Walleye Pollock Stock Assessment for 2002, 18. Plan Team November 14, 2001.
153 NMFS 2001 Draft PSEIS, Sec. 3.3, p. 3.

of pollock. Identified seabird predators of pollock include black-legged kittiwake, common murre, thick-billed murre, tufted puffin, horned puffin, pigeon guillemot, pelagic cormorant, marbled murrelet, Kittlitz's murrelet, ancient murrelet, and parakeet auklet.[154] Groundfish predators of pollock include adult pollock, arrowtooth flounder, Pacific halibut, Greenland turbot, flathead sole, as well as Pacific cod, sablefish, Pacific sandfish, sculpin, and Alaska skate.[155] Given the keystone status of pollock in the Bering Sea, the operative assumption of "surplus" production in the MSY-based $F_{40\%}$ strategy must be re-examined.

2.2 Aleutian Islands Pollock

2.2.1 Historical Glimpse

Between 1990 and 1998, more than 465,000 mt were taken out of the Aleutian Islands pollock stock in a brief, intense winter fishery on spawning aggregations, and nearly all of it from sea lion critical habitat. There is clear evidence of serial depletion of this stock over the course of the 1990s, based on survey data and the westward progression of the pollock fleet in search of fishable spawning aggregations. Pollock fisherman and North Pacific Fishery Management Council Advisory Panel member Dave Fraser described the pattern in the Aleutian Islands pollock fishery during the 1990s:

> "A few years ago the entire Aleutian pollock TAC was taken basically out at [Islands of the] Four Mountain, the 170 line, because it was as close to town [Dutch Harbor] as possible and logistics are easy. A couple of years later, people just steamed right on by Four Mountain because there wasn't much there. Then the effort was at Seguam Pass, and then a couple of years later it was at North Head on the other side of Atka, and then the last couple of years it's been out at Tanaga. Although the TAC for the Aleutians might be entirely appropriate if effort were evenly distributed over the Aleutians, it's real evident that we're fishing one little spot at a time and knocking it down. It's a completely wrong way to go about it."[156]

Few pollock are found today in the Amukta Pass region, where large pollock spawning aggregations were exploited in the early 1990s. As an important secondary prey item for Steller sea lions in the Aleutian Islands, the loss of this resource due to serial depletion in the 1990s constitutes a major adverse impact on prey availability.

The pattern of serial depletion of Aleutian pollock and accompanying declines in pollock survey abundance prompted the North Pacific Fishery Management Council to close the Aleutian pollock fishery after 1998, in keeping with past BS/AI Groundfish Plan Team recommendations for a moratorium on directed fishing for Aleutian Islands pollock:

> ". . . the Plan Team believes that the Aleutian pollock fishery should be managed on a bycatch-only basis for the following reasons: 1) the trawl survey time series indicates that

[154] T.R. Loughlin, Irina N. Sukhanova, Elizabeth H. Sinclair, and Richard C. Ferrero. Summary of Biology and Ecosystem Dynamics of the Bering Sea. In: Dynamics of the Bering Sea, T.R. Loughlin and Kiyotaka Ohtani, eds. University of Alaska Sea Grant. Fairbanks, 1999.
[155] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 6 and Table 3.3-3.
[156] Center for Marine Conservation. Alaska Seas Marine Conservation Biology Workshop Report, Anchorage, Alaska, October 6 - 7, 1997.

the Aleutian pollock biomass has declined sharply and consistently since 1983, and gives no reason to expect an upturn in the foreseeable future; 2) some fish captured in the Aleutian Islands region may be part of the Aleutian Basin stock, a stock on which fishery impacts should be minimized; and 3) pollock has been shown to be an important prey item for Steller sea lions breeding on rookeries just to the east of the Aleutian Islands management area, rookeries which recently have fared better than those for which the availability of prey consists largely of Atka mackerel." (NPFMC BSAI SAFE Report for 1997, November 1996).

The Aleutian Islands region pollock stock has declined steadily in the surveys since the early 1980s (Table 2). The 2000 Aleutian triennial trawl survey pollock biomass estimate ranged from 20-50% of its value in the early 1980s, when systematic trawl surveys began. Results from the 2000 Aleutian Islands triennial groundfish survey indicate a 16% decline in revised Aleutian IslandsI/Unalaska-Umnak area (165W-170W longitude) biomass from 158,912 mt in 1997 to 133,366 mt in 2000, and an 11% increase in revised estimates for Aleutian Islands west of 170W long.[157] Even with the 11% increase in survey pollock biomass west of 170W longitude, however, the stock remains at only about 20% of its 1983 survey biomass.

Table 2 -- Pollock biomass estimates from the Aleutian Islands Triennial Groundfish Survey, 1980-2000.

	Aleutian Island and Unalaska-Umnak area (165W-17W long)		Aleutian Region (170E-170W)	
Year	Old estimates	New estimates	Old estimates	New estimates
1980	308,745		252,013	
1983	778,666		495,982	
1986	550,517		448,138	
1991	183,303	218,783*	179,653	167,140*
1994	151,444	117,198	86,374	77,503
1997	205,766	158,912	105,600	93,512
2000	180,456	133,366	132,145	105,554

Source: Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, Table 1.19, p. 126. BSAI SAFE as Projected for 2001. NPFMC, November 2000.
*Estimates since 1991 have been revised due to discrepancies in the strata definitions of the surveys.

2.2.2 ABC Recommendation

No new information on Aleutian Islands pollock is available for the 2002 stock assessment because there was no new survey information in 2002. Uncertainties about the discreteness of the Aleutian Islands pollock stock and its relation to the other pollock stocks abound. The stock assessment advice acknowledges that the status and dynamics of this stock are not well understood, that catch-age data is limited, and that reliable estimates of F_{MSY}, B_{MSY}, $F_{40\%}$ or $B_{40\%}$ do not exist for the Aleutian portion of the pollock stock.[158] Therefore Aleutian Islands pollock falls into Tier 5 of the FMP overfishing definition (Amendment 56) and a fishing mortality rate is set arbitrarily at F equals

[157] Ianelli et al., 2000. Preliminary Draft BSAI Pollock Assessment for 2001 prepared for November Plan Team meeting, Table 1.19, p.87.
[158] Ianelli et al., 1999. BSAI SAFE Report for 2000, November 1999, pp. 115-116.

.75 of the estimated natural mortality rate (M) as a “conservatism,” even though the addition of the fishing mortality nearly doubles the estimated mortality rate for this stock.

Lacking new information and recognizing the uncertainties associated with this “stock,” the Plan Team recommended no directed fishing in 2002 in keeping with the North Pacific Council moratorium on directed fishing that began in 1999 due to low stock size.

2.3 Bogoslof Island / Aleutian Basin Pollock

A large winter pollock roe fishery developed in the late 1980s in the area around Bogoslof Island, within the boundary of the Steller critical foraging habitat area now known as the Sea lion Conservation Area, “SCA”. This fishery removed about 1 million metric tons of spawning pollock from 1987-92 at the same time that large quantities of the stock were being extracted from the central Bering Sea known as the Donut Hole. The combined fishery was closed in 1992 following the rapid decline in pollock biomass in both areas by the early 1990s.

Bogoslof pollock biomass declined from 2.4 million metric tons in 1988 to 600,000 metric tons by 1991. Since 1992 the Donut Hole Treaty closed the Bogoslof District, known as Area 518, to directed pollock fishing to protect this so-called "Aleutian Basin" stock. Survey biomass trends for the Bogoslof/Aleutian Basin stock indicate continued declines despite an eight-year moratorium on pollock fishing on this population. A time series of declining pollock biomass in the Bogoslof Island region is provided from annual winter hydroacoustic surveys between 1988-2000 in Table 3. The 2001 survey estimate of 232,000 mt is only 9.68% of the biomass estimate from 1988, and the trend is inexorably downward with no indication of strong recruitment to the stock by juvenile age classes.

Table 3 – Bogoslof Pollock Spawning Biomass 1988-2000

Year	Biomass (million tons)
1988	2.396
1989	2.126
1990	
1991	1.289
1992	.940
1993	.635
1994	.490
1995	1.104
1996	.682
1997	.392
1998	.492
1999	.475
2000	.301
2001	.232

Taina Honkalehto, Paul Walline, Denise McKelvey, and Neal Williamson. . Echo integration-trawl survey of Walleye Pollock on the southeastern Bering Sea shelf and in the Aleutian Basin near Bogoslof Island in February and March, 2001. Preliminary Cruise Results, Acoustic-Trawl Survey of Walleye Pollock in the Southeast Bering Sea Shelf and Aleutian Basin near Bogoslof Island. Appendix 1 to the 2002 Bering Sea/ Aleutians Islands Pollock Stock Assessment (NPFMC BSAI SAFE for 2002).

Serial fishery depletion of pollock spawning aggregations along the Aleutian chain during the 1990s may have exacerbated this decline, since the Bogoslof/Aleutian Basin pollock stock structure is not well defined.[159] Furthermore, pollock abundance in the Basin may be related to strong year classes on the shelf:

> "Data on the age structure of Bogoslof-Basin pollock show that a majority of pollock in the Basin originated from year-classes that are strong on the shelf, 1972, 1978, 1982, 1984, and 1989. The mechanism causing pollock to move from the shelf to the Basin appears to be density related, with the abundance in the Basin proportional to year-class size. . . . Recruits to the Basin are coming from another area, most likely the surrounding shelves either in the U.S. or Russian EEZ."[160]

If recruits to the Basin pollock population come from the surrounding shelves, rebuilding and replenishment of the population would depend on the density dependent "spill-over" effect from superabundant year classes in adjacent areas of the eastern Bering Sea. However, there was no consideration of the need to allow this density dependent process to function when the eastern Bering Sea pollock ABC level for 2001 was set at 1,842,000 metric tons – a 62% increase from the 2000 ABC and 400,000 mt greater than the largest catch in the past 20 years (1.455 million mt in 1990) – based on the estimated strength of one recruiting year class of fish from 1996. If the EBS pollock fishery takes this surge of new "recruits" from the 1996-year class in a few years, those maturing fish may not migrate into outlying areas, in which case hopes for rebuilding of the Bogoslof/Aleutian Basin pollock stock appear very dim indeed.

2.4 Russian-Flagged Navarin Basin Pollock Fishery

With the collapse of the western Bering Sea pollock stock in the early 1990s, a large Russian-flagged factory trawl fleet has converged on the pollock stock in Navarin region of the Northwest Bering Sea. "For the Northwest Pacific Ocean, catches of Alaska Pollack [sic] reported to the FAO have averaged around four million tones annually for the period 1984-98 . . . with a decline

[159] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, p.39. BSAI SAFE Report as Projected for 2000. NPFMC, November 1999.
[160] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, p 119. BSAI SAFE Report as Projected for 2000, November 1999.

noted in the late 1990s from 3,450,800 t in 1995, to 2,266,200 t in 1999. The Russian Federation records the largest catches in the Pacific Northwest, and Russian catches show declines in line with overall declines for the whole region."[161] There are large uncertainties about the effects of pollock fishing by Russian-flagged factory trawlers in the Navarin region, whose catches are believed to consist predominantly of eastern Bering Sea-spawned juvenile pollock cohorts which would otherwise return to spawn as adults in U.S. waters.[162] The spatial and temporal concentration of the pollock fishery that occurred in the southeastern Bering Sea region during the 1990s is paralleled by the concentration of the Navarin fishery, fishing on the same stock of fish. (see Table 4 below). It is unclear exactly how much pollock the Russian-flagged trawlers are taking in the Navarin region every year, but catches are reported to be about 500,000 mt/year during recent years, and higher than that in earlier years. "Alaska Pollack [sic] fishing is plagued by illegal activity. The actual volume of Alaska Pollack [sic] that is harvested according to *Kamchatrybvod* staff [the Kamchatka regional branch of the State Committee of Fisheries] is 150% of the quota."[163]

The Navarin catch is additive to the catch of the U.S.-flagged fleet, since the EBS pollock is a straddling stock with a continuous distribution into the Russian EEZ from the Pribilofs to Cape Navarin. In effect, the EBS pollock TAC has recently been not approximately 1.2 million mt/year as authorized by the TAC approved by NMFS, but at least 1.7 million mt/year – far higher than the plan team ABCs in most years. Since Russian exploitation of the stock is not factored into exploitation rates for the U.S. fishery, the actual exploitation rate on the EBS pollock stock may be significantly higher than the 18-20% estimated for the domestic fishery -- perhaps as high as 30%.[164]

The stock assessments fail to incorporate the uncertainties about Russian fishery impacts on the subsequent recruitment of juvenile fish to the EBS shelf or the additive effects of the Navarin fishery on stock assessment advice and ABC calculations. They also fail to consider NMFS's own research in the FOCI program indicating the pollock migrate widely around the Bering Sea basin during summer foraging trips and therefore "would experience two independent sources of fishing mortality in two management regions" (Macklin 1998).[165]

Table 4. Russian Bering Sea pollock catches in the Navarin Region (1)		
Year	Navarin Catch (1,000s tons)	% of Russian Bering Sea Catch
1976	467,000	85%
1977	180,000	68%
1978	254,000	61%
1979	285,000	52%
1980	620,000	49%
1981	900,000	75%

[161] Alexey Vaisman, Trawling in the Mist: Industrial Fisheries in the Russian Part of the Bering Sea, A Traffic Network Report, World Wildlife Fund, 2001, p. 25.
[162] Wespestad et al. 1996, 1997; Ianelli et al., 1998, 1999, 2000.
[163] Alexey Vaisman, Trawling in the Mist: Industrial Fisheries in the Russian Part of the Bering Sea, A Traffic Network Report, World Wildlife Fund, 2001, p. 25.
[164] BS/AI Groundfish Plan Team, 1996.
[165] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 46.

1982	804,000	64%
1983	722,000	65%
1984	503,000	50%
1985	488,000	58%
1986	570,000	69%
1987	463,000	63%
1988	852,000	76%
1989	684,000	70%
1990	232,000	53%
1991	178,000	39%
1992	316,000	53%
1993	389,000	46%
1994	178,000	43%
1995	320,000	98%
1996	753,000	95%
1997	680,000	93%
1998	627,000	NA
1999	?500,000	NA
2000	?500,000	NA
(1) Ianelli et al., 2000. EBS Bering Sea pollock stock assessment for 2001.		

VI. SPATIAL TEMPORAL CONCENTRATION OF THE POLLOCK FISHERIES

The main fishing grounds on the eastern Bering Sea shelf encompass an area larger than California, accounting for about half of the marine fish and shellfish caught in the United States annually – nearly 75% of which is comprised of pollock.[166] However, the EBS pollock fishery is concentrated spatially in a few highly productive areas from the Unimak Pass region northwestward to the Pribilof Islands between the 100 and 200 meter depth contours near the shelf break in rich upwelling zones that have supported large populations of fish and other wildlife historically, known as the "greenbelt."[167] During the mid- to late-1990s, 50-70% of the Bering Sea/Aleutian Islands pollock fishery catch was taken from Steller sea lion critical habitat, a leading factor in the National Marine Fisheries Service successively finding that the pollock fisheries jeopardize Steller sea lions and adversely modify their critical habitat. Similar spatial concentration of the Gulf pollock fishery has continued into the present, where no sea lion Reasonable and Prudent Alternative restrictions pursuant to the ESA on catch in critical habitat have ever been imposed and where 50-90% of the annual fishery catches have been taken from critical habitat since the early 1980s.

[166] S.A. Macklin (editor). 1999. Report of the FOCI International Workshop on Recent Conditions in the Bering Sea, Seattle, WA, November 9-10, 1998. NOAA/Pacific Marine Environmental Laboratory, January 1999.

[167] Springer, Alan M., C. Peter McRoy, and Mikhail V. Flint. 1996. The Bering Sea Green Belt: shelf-edge processes and ecosystem production. Fisheries Oceanography 5 (3/4): 205-223.

NMFS has concluded that the intense spatial and temporal concentration of the pollock fisheries jeopardizes the survival and recovery of endangered Steller sea lions and adversely modifies sea lion critical habitat.[168] The percentage of the BSAI pollock TAC taken in the first quarter of the year on spawning pollock has mushroomed since the mid-1980s. The 1990s BS/AI roe fishery on spawning pollock removed approximately half a million metric tons of spawning pollock that would otherwise contribute to the annual production of the age-0 fish – nearly ten times higher than first quarter removals prior to 1986.

Densely schooled spawning aggregations are more susceptible to overfishing, and pollock is no exception. Episodes of intense fishing on spawning stocks in the Shelikof Strait (1981-1985), Bogoslof/Aleutian Basin (1987-1991), and Aleutian Islands (1990s) have been followed by steep declines in pollock abundance in each of those areas, as noted in successive NMFS Biological Opinions. Despite BiOp recommendations to disperse the BSAI pollock fishery temporally into four seasons and disperse the fishery outside the winter season, the fishery remains concentrated in the January to March roe-bearing period. This temporal concentration is attributable to the fact that the pollock industry prizes the pollock roe, which fetches a high price in Japan and Korea. The peak of roe quality comes during this January to March period, thus there is a narrow window of opportunity to catch pollock in peak egg-bearing condition.

The existing fishery management regulations fail to address the spatial and temporal concentration of the pollock fisheries in the BSAI and GOA. The available information also fails to show that FMP Amendment 61, which implemented the American Fisheries Act, has substantially addressed the impacts to the environment identified in successive ESA Section 7 consultations that concluded that the pollock fisheries jeopardize the survival and recovery of Steller sea lions and adversely modify sea lion critical habitat.

1. Spatial concentration of the pollock fisheries continues despite ESA requirements to disperse fishery catches geographically outside Steller sea lion critical habitat

1.1. BS/AI pollock fishery

Although Ianelli *et al*. (2000) concluded that some spatial dispersion of the BSAI pollock catch occurred over the period between 1998-2000 under pollock RPA emergency rules,[169] as indicated by an analysis of catch per 100 km^2, this fishery remains highly concentrated on the boundaries of critical habitat in the Sea lion Conservation Area (SCA) and

[168] NMFS December 1998 BiOp, NMFS November 2000 BiOp .

[169] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, p. 95, Figure 1.7. In: BSAI Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2001. NPFMC, November 2000.

in the area northwestward along the 100-200 m depth contour from Unimak Pass to the Pribilof Islands, particularly but not only in the first half of year.[170] In other words, the pollock fleet is not distributing catches over the entire range occupied by the pollock stock; rather, it is concentrating disproportionately on portions of the stock.

The December 3, 1998, Biological Opinion required spatial dispersal of the Bering Sea pollock fishery in proportion to the stock distribution in three broad areas, based on available summer survey information (see Table 8 below):

(1) critical habitat in the eastern Aleutian Islands (Sea Lion Conservation Area, "SCA"),
(2) areas outside of critical habitat to the east of 170W longitude
(3) areas outside of critical habitat to the west of 170W longitude.

This RPA measure was never implemented. NMFS originally proposed spatial dispersal of the eastern Bering Sea pollock TAC east and west of the 170W. longitude line outside the SCA to address the effects of fishing effort displaced by the RPA limits on catch in the SCA, more specifically, to mitigate the intercept or "edge effect" of a massive pollock fishery concentrated on or near the boundaries of SCA critical habitat:

> "To avoid localized concentration of harvest, mechanisms are needed to disperse the catch over a wider area. Apportionment of some of the TAC to [the] west of the 170W long. line provides a mechanism to reduce the probability for adverse ecosystem effects that result from spatially concentrated harvest. Importantly, measures that help disperse the catch in accordance with the distribution of the stock will also tend to prevent an edge effect simply by limiting the extent to which catch can be concentrated in any given area"[171]

As noted above, in 1996 the National Research Council concluded that spreading out the large pollock fishery in time and area may prove beneficial to predators.[172] Failure to apply spatial dispersion regulations to the Bering Sea pollock fishery fish resulted in steady concentration of the catch in the SCA over the past eighteen years, as indicated by fishery catch distributions under the foreign and domestic pollock fisheries (Table 5):

Table 5 -- Average Eastern Bering Sea Pollock Catch By Area, 1982-1998

[170] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, Fig. 1.2, p. 92. In: BSAI SAFE Report as Projected for 2001. NPFMC, November 2000.
[171] NMFS 1999 Draft EA/RIR to Implement Pollock RPAs, Section 2.2.3, p. 44.
[172] National Research Council. The Bering Sea Ecosystem. National Academy Press, Washington D.C., 1996, p. 6.

Catch By Area and Percent By Area:	1982-1986		1982-1989		1987-1998		1990-1998		1996-1998	
	tons	%	Tons	%	tons	%	tons	%	tons	%
SCA	229,534	21%	351,728	32%	610,207	51%	628,482	52%	628,056	58%
E170W	388,535	35%	324,336	30%	244,954	21%	254,159	21%	268,310	25%
W170W	453,505	43%	418,188	38%	330,804	28%	321,297	27%	187,102	17%
Average Catch/Year:	1,071,575 mt		1,094,252 mt		1,185,965 mt		1,203,938 mt		1,083,470 mt	
Total Catch By Period:	5,357,875 mt		8,754,008 mt		14,231,580 mt		10,835,440 mt		3,250,410 mt	
Source: NMFS EA/RIR to Implement Pollock RPA Protection Measures, May 11, 1999, pp. 85-86, Table 3-1.										

The concentration of catch in the southeastern Bering Sea/SCA region is partly the result of overfishing in the central Bering Sea (Donut Hole) and Bogoslof Island/Aleutian Island regions in the late-1980s and early 1990s. (See Tables 11 and 12 for Winter Bogoslof/SCA survey estimates). Closure of the Donut Hole and Bogoslof Island District 518 since 1993 further shifted fishing effort eastward toward the shelf, particularly in the winter "A" season on pollock spawning grounds in the Unimak Pass region, located near the fish large processing plants at Dutch Harbor and Akutan. As result, 50-70% of the annual EBS pollock catch was concentrated in the SCA during the 1990s. As reflected below in Table 6, spatial dispersion of the pollock catch outside the pelagic foraging habitat of the SCA under the 1999-2000 pollock Revised Final RPA (RFRPA) was significant:

Table 6 -- Bering Sea pollock percent and tons of catch taken from critical habitat (mostly from the SCA), 1977-2000.

Year	%	Tons	Year	%	Tons	Year	%	Tons
1977	21.6	213,527	1985	20.2	242,334	1993	49.0	679, 586
1978	22.5	221,741	1986	22.7	268,967	1994	61.2	870,239
1979	10.6	97,684	1987	48.5	508,150	1995	69.1	849,556
1980	9.5	96,465	1988	53.7	418,933	1996	54.4	614,354
1981	26.3	270,334	1989	45.8	547,690	1997	55.9	594,065
1982	28.3	286, 885	1990	36.7	462,523	1998	58.4	607,760
1983	29.3	304,624	1991	52.6	587,160	1999	37.0	350,914
1984	25.2	295,064	1992	46.8	655,029	2000	19.0	217,847

Source: NMFS/AFSC unpublished Observer Program blend data.

Despite successes in reducing pollock removals in the SCA under the 1999-2000 pollock RPA emergency rules, however, the eastern Bering Sea pollock fishery remains intensely concentrated in the southeastern Bering Sea (Table 7 below). Nearly three-quarters of the catch was taken east of 170 degrees W. longitude in the southeastern Bering Sea in 2000, much of it concentrated on or near the SCA boundary. While significant dispersion outside the Sea lion Conservation Area occurred under the pollock RPA regulations of 1999-2000, further spatial dispersion of this giant fishery outside critical habitat has not been implemented under successive pollock RPA emergency rules. The proposed FMP BiOp and RPA BiOp RPA regulations would perpetuate the status quo condition in which there is only minimal spatial allocation of the EBS pollock TAC, that is, inside and outside the SCA:

Table 7 -- Directed pollock fishery catch by area from the eastern Bering Sea, the Aleutian Islands, the "Donut Hole" (Central Bering Sea), and Bogoslof Island (Aleutian Basin), 1979-2000. (1)

Eastern Bering Sea					Donut H	Bogoslof I
Year	Southeast	Northwest	Total			
1979	368,848	566,866	935,714	9,504		
1980	437,253	521,027	958,280	58,156		
1981	714,584	258,918	973,502	55,516		
1982	713,912	242,052	955,964	57,978		
1983	687,504	293,946	981,450	59,026		
1984	442,733	649,322	1,092,055	81,834	181,200	
1985	604,465	535,211	1,139,676	58,730	363,400	
1986	594,997	547,966	1,141,993	46,641	1,039,800	
1987	529,461	329,955	859,416	28,720	1,326,300	377,436
1988	931,812	296,909	1,228,721	30,000	1,395,900	87,813
1989	904,201	325,399	1,229,600	15,531	1,447,600	36,073
1990	640,511	814,682	1,455,193	79,025	917,400	151,672
1991	712,206	505,095	1,217,301	78,649	293,400	264,760
1992	663,457	500,983	1,164,440	48,745	10,000	160
1993	1,095,314	231,287	1,326,601	57,132	1,957	886
1994	1,183,360	180,098	1,363,458	58,637	NA	566
1995	1,170,828	91,939	1,262,766	64,429	Trace	264
1996	1,086,840	105,938	1,192,778	29,062	Trace	387
1997	820,050	304,543	1,124,593	25,940	Trace	168

1998	965,766	135,399	1,101,165	23,822	Trace	136
1999	814,622	177,378	988,674	965	Trace	29
2000*	811,768	300,477	1,112,245	1,165	NA	28

(1) Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, Table 1.1, p. 73. BSAI SAFE as Projected for 2001. All numbers in metric tons (mt). 1979-1989 data are from Pacfin. 1990-1999 catch data are from NMFS Alaska regional office, and include discards.
* Unofficial 2000 estimate based on observer catch data from AFSC, directed pollock fishery only.

In the December 3, 1998 BiOp, NMFS recommended distributing the Bering Sea pollock catch proportional to biomass distribution during the summer/fall period, based on the most recent summer trawl survey information. Under the pollock emergency rule RPA in 1999, 73% of the A-season pollock catch and 32% of the B-season catch was taken from the Sea lion Conservation Area (SCA) during the January-April period.[173] For the C/D fall season fishery, 25% and 35% the respective season TACs could be taken from the SCA, with a goal of reducing the C/D season percentages of TAC in the SCA to 15% and 25% respectively in 2000. The intent of the C/D season measures was to prevent the disproportionate catch rates in the fall period (Table 3.19), based on summer survey biomass estimates indicating that a small percentage of the managed stock as a whole resides in the SCA during the summer/fall period (Table 3.20). In the November 2000 FMP BiOp and 2001 RPA BiOp, however, NMFS does not even consider its own analyses from 1999 indicating that a very small percentage of the pollock biomass is found in the SCA critical habitat during the summer and early fall period,[174] as shown in Table 8:

Table 8 – Percent EBS pollock stock biomass distribution by area based on summer surveys for the periods 1997-1998, 1991-1998, 1982-1998.

AREA:	% 1997-1998	% 1991-1998	% 1982-1998
SCA	6.5	14.5	12.4
E170W	35.5	30.2	25.8
W170W	58.0	55.3	61.7

The only restriction on catches in SCA critical habitat under the 2002 Steller sea lion interim emergency rules is a provision to limit the percentage of the annual TAC taken within the SCA to 28% until April 1, after which time there are no further limitations on catch in critical habitat of any kind for the remainder of the year.[175] In the 2002 Emergency Interim Rules, NMFS fails to provide any rationale or new evidence to justify the complete lack of caps on catch in SCA critical habitat during the fall fishery or lack of spatial dispersion of Bering Sea pollock TAC by management areas in the summer/fall fishery, based on the biomass distributions from the annual summer trawl surveys in the Bering Sea. NMFS provides no rationale whatever for ignoring previous agency analyses and RPA recommendations in the new 2002 Emergency Interim Rules.

1.2 GOA pollock fishery

[173] Ianelli *et al*. Eastern Bering Sea Walleye Pollock Stock Assessment, p. 68. *In*: BSAI SAFE Report as Projected for 2001. NPFMC, November 2000.
[174] NMFS EA/RIR to Implement Pollock RPAs, May 1999: EBS Pollock Catch and Stock Biomass Distribution, 1982-1997, pp. 79-125.
[175] 67 Fed. Reg. 974 (January 8, 2002).

Unlike the BS/AI pollock fishery, the GOA pollock fishery TAC has been distributed by three broad management areas (610, 620, 630) in the central and western GOA since 1990. However, analyses of the available Observer Program fishery data indicate that spatial distribution of the TAC has not resulted in reduced fishery catches in sea lion critical habitat. For instance, from 1990-1997 an average of 63% of the observed GOA pollock catch came from within 20 nm of sea lion rookeries and major haulouts listed as critical habitat, with more than twice as much (43%) taken between 10 and 20 nm as within 10 nm (21%):

Table 9 -- Average percent of observed GOA pollock catches within 10-20-40 nm

of sites listed as critical habitat in the west-central Gulf of Alaska, 1990-97

Within 10 nm	Within 20 nm	Within 40 nm
21%	63%	97.5%

Source: NMFS/AFSC unpublished Observer Program fishery data. EA/RIR to Implement Pollock RPAs, Appendix F, May 11, 1999.

In 1999, 82% of the GOA pollock catch was taken within critical habitat under the pollock RFRPA measures. Table 10 below provides a more detailed breakdown of the distribution of GOA pollock catches within critical habitat by season and management area for 1999.

Table 10 -- GOA pollock catches (metric tons) inside critical habitat by management area, 1999.

Total Pollock Catch						
Season	Months	610	620	630	640	Total GOA
A	Jan-Feb	6,885	11,556	13,063	92	31,596
B	June	5,315	7,207	6,379	-	18,901
C&D	Sept-Oct	4,975	10,499	9,613	-	25,087
	All year	17,175	29,262	29,055	92	75,584
Total GOA Pollock Catch (Inside/Outside Critical habitat):						92,121

Percentages Inside CH by area:						
Seasons	Months	610	620	630	640	Total GOA
A	Jan-Feb	85%	93%	97%	5%	88%
B	June	82%	92%	97%		90%
C&D	Sep-Oct	58%	62%	96%		71%
	All year	74%	79%	97%	5%	82%

Source: NMFS/AFSC unpublished Observer Program fishery data.

In other words, temporal dispersion of the GOA pollock TAC across broad management areas has not reduced the annual percentages and tons of the pollock TAC taken from Steller sea lion critical habitat. Despite broad spatial dispersion, the TAC remains concentrated spatially in intense pulses of fishing by an overcapitalized trawl fleet.

The December 3, 1998 BiOp's RPA contained a spatial dispersion objective aimed at distributing fishery TAC proportional to the distribution of the exploitable pollock biomass.[176] As a principle, distributing catches proportionally to biomass distribution of the target stock is intended to reduce the likelihood of disproportionate removal rates relative to regional stock abundance (e.g., localized depletion) by dispersing TAC across broad management areas. Although the Gulf pollock fishery TAC (unlike the BS/AI pollock TAC) has been distributed by three broad management areas in the central and western GOA, based on biomass distributions from the triennial groundfish trawl surveys, there is considerable uncertainty about the spatial distribution of the stock even in years when new survey information is available.

For example, in the 1999 GOA triennial trawl survey 72% of the survey biomass was concentrated in the Shumagin Islands (western GOA) in a few hauls, as compared to a four-survey (1984-1996) average of 41% for the Shumagin area.[177] No one knows for sure if this apparent biomass concentration is an artifact of sampling errors or whether it reflects a major shift in stock biomass away from the central GOA to western GOA. The GOA Plan Team broke from standard practice by recommending that the 2000 pollock ABC should be apportioned according to the four-survey average distribution, reflecting their own lack of confidence in the 1999 survey data:

> "The Plan Team recommends the 2001 ABC be apportioned according to mean distribution of the exploitable biomass in the four most recent bottom trawl surveys.

[176] NMFS December 3, 1998 BiOp, p. 117.

[177] Martin W. Dorn *et al*., Assessment of the Walleye Pollock Stock in the Gulf of Alaska, Fig. 1.7, p. 79. *In*: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2001. NPFMC, November 1999.

Using just the 1999 trawl survey distributions was not selected because of high variability observed in the 1999 trawl survey distributions."[178]

The December 3, 1998 BiOp noted that distribution of the pollock TAC by distribution of the stock biomass across broad management areas is likely not sufficient in itself to protect Steller sea lion critical habitat from the localized depletion effects of fishery removals.[179] In addition, the survey data are not designed to determine pollock biomass distribution in sea lion critical habitat and provide only limited seasonal coverage:

"As a management principle, the use of the pollock stock distribution to spatially allocate catch is problematic in both the BSAI and GOA. Stock assessment surveys are currently designed to determine pollock biomass, not distribution with respect to Steller sea lion critical habitat. In addition, the surveys are not conducted year-round, and are therefore sufficient to determine distribution during selected seasons only."[180]

In the November 2000 FMP BiOp, NMFS re-emphasized that the available survey information is inadequate to determine the availability of prey at the spatial scales of importance to individual foraging sea lions, and thus the BiOp principle of distributing fisheries catches in proportion to the available stock biomass is often thwarted by lack of fine-scale abundance data:

"The lack of fine-scale survey information on the spatial distribution of the stocks has made it difficult to distribute catch in proportion to biomass, even though distributing catch in this manner has been identified as an important principle for management of these fisheries."[181]

In any case, regulations to distribute the Gulf pollock TAC spatially in proportion to stock biomass distribution from the surveys across broad management areas have not reduced catches in critical habitat. In fact, a higher proportion of the catch was concentrated in GOA critical habitat under the pollock RPA rules, which is not surprising since no RPA rules have established limits on total allowable catches within GOA sea lion critical habitat.

2. Temporal concentration on spawning pollock in the winter period continues despite legal requirements to disperse the fishery temporally and research indicating that such fishing may threaten the long-term health of the pollock stocks.

The percentage of the pollock TAC taken in the first quarter of the year on spawning fish has mushroomed since the 1980s. The current pollock roe fishery on spawning pollock removes approximately half a million metric tons of spawners that would otherwise contribute to the annual

[178] Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the Gulf of Alaska as Projected for 2001, Overview of Stock Assessments, p. 8.
[179] NMFS December 3, 1998 BiOp, p. 117.
[180] NMFS December 3, 1998 BiOp, p. 117.
[181] NMFS November 2000 FMP BiOp, p. 202.

production of the age zero fish -- roughly an order of magnitude higher than first quarter removals prior to 1986. Densely schooled spawning aggregations are more susceptible to overfishing,[182] and pollock is no exception. Episodes of intense fishing on spawning stocks in the Shelikof Strait, Gulf of Alaska (1981-1985), Bogoslof/Aleutian Basin (1987-1992), and Aleutian Islands (1990s) have been followed by steep declines in pollock abundance in each of those areas, as noted in successive NMFS Steller sea lion Biological Opinions.[183] Successive FMP amendments addressing pollock management failed to prevent such serial depletion of spawning stocks. The management system fails to address the potential impacts that serial depletion may have on the genetic diversity and long-term health of the stocks in a purely single-species context and fails to address the impacts to competing predators such as Steller sea lions in an ecosystem context.

In the December 3, 1998 Steller sea lion Biological Opinion, NMFS recommended RPA principles and criteria to address temporal/spatial dispersion of the pollock fisheries, which included two key objectives for temporal dispersion:

1st objective: temporal dispersion to avoid removal during the winter period
2nd objective: distribute catch more evenly over course of the year

NMFS also recommended temporal dispersion in accordance with the following criteria, including a quarterly approach to allocation of the giant Bering Sea pollock fishery TAC:

- Continue prohibition of pollock fishing 1 Nov-19 Jan in Bering Sea and Gulf of Alaska
- Distribute catch into at least four seasons, two seasons from January through May and two seasons from June through October
- Limit combined TAC in winter/spring to maximum of 45% of annual TAC
- Allocate single-season TACs to be no more than 30% of annual TAC
- Prevent concentration of catch at end of one season, and the beginning of the next
- Limit rollovers of unused TAC from one season to the next

The 2000 FMP BiOp and the 2001 RPA BiOp did not incorporate these criteria. Neither BiOp provides an explanation or justification for rejecting these recommendations for TAC allocation in the Bering Sea both inside and outside the critical habitat boundaries. The fisheries remain substantially concentrated in time, particularly in the winter and early fall periods.

2.1 The temporal concentration of eastern Bering Sea pollock continues under current regulations.

During the 1990s, the BS/AI pollock fishery became concentrated in two massive, short-lived pulse fisheries concentrated temporally in the first quarter of the year and the beginning of the fall period. After 1993, closure of the "Donut Hole" fishery and Bogoslof Island District 518 further shifted fishing effort eastward toward the continental shelf during the January-March "A" season on pollock spawning grounds in the Unimak Pass region, located in Steller sea lion critical habitat near the large fish processing plants at Dutch Harbor and Akutan, now designated as the Sea

[182] Jeffrey A. Hutchings. Spatial and temporal variation in the density of northern cod and a review of hypotheses for the stock's collapse. Can. J. Fish. Aquat. Sci. 53: 943-962 (1996).
[183] NMFS December 3, 1998 BiOp, NMFS November 2000 FMP Biop.

lion Conservation Area (SCA). Previously these pollock spawning grounds had been protected from trawling because during the foreign fishery of the late 1970s and early 1980s, this zone was encompassed within the Winter Halibut Savings Area, where pollock trawling was prohibited from December 1 to May 31.[184]

The December 3, 1998 BiOp noted that the large increases in domestic pollock fishery catches from the eastern Aleutian Islands SCA over the course of the 1990s occurred principally during this winter pollock fishery in the January-March A-season.[185] The eastern Bering Sea pollock fishery showed no temporal dispersion of the fishery outside the January through March winter period under the Steller sea lion/pollock RPA rules of 1999-2000.[186] Indeed, 40% of the 2001 TAC of 1.4 million mt (about 560,000 mt) could be caught in one combined A/B season outside critical habitat boundaries under the 2001 Steller sea lion emergency rules, without any further spatial dispersion,[187] and the 2002 Steller sea lion interim emergency rules perpetuate that temporal pattern while allowing virtually unlimited pollock fishing in critical habitat.[188]

The concentration of this large roe fishery on spawning pollock from late January to mid-March has been the status quo condition of the fishery since the late-1980s. The season lengths of the winter fishery have ranged from 25-60 days for shore-based catcher boats and offshore factory trawlers, and the season has not been appreciably lengthened under the inadequate pollock RPAs of 1999 and 2000. In 2000, the offshore co-operative under the American Fisheries Act (AFA) did slow down the fishery somewhat, extending the winter fishery to about 60 days as reflected in reduced daily catch rates. The daily catch rates for the eastern Bering Sea pollock fishery decreased 22%, attributable to AFA pollock co-operatives rather than the pollock RFRPAs, as noted by NMFS: ". . . it is unlikely that daily catch rates would have been reduced as a result of the RFRPAs alone."[189] Nevertheless, daily and weekly catch totals have remained at very high levels and the length of the winter season has been extended only marginally, resulting in one continuous pulse of fishing on spawning pollock.

A prime industry premise for concentrating the contemporary Bering Sea pollock fishery on the late-winter spawning grounds in the eastern Aleutians is the assumption that the majority of the pollock stock biomass is distributed in the region at that time. However, winter survey biomass information for the SCA and surrounding area does not support that assumption. The winter distribution data has been gathered opportunistically during the 1990s Bogoslof hydroacoustic surveys, conducted annually in late February. Analysis by NMFS in the May 1999 EA/RIR to Implement Pollock RPAs used the available 1991, 1993, and 1995 Bogoslof winter surveys of the SCA (Table 11 below) and concluded that the proportion of age 3+ pollock biomass within the SCA in winter has likely been within the range of 20-40%, depending on assumptions about the selectivity of the trawl gear.[190]

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184 Fredin, R.A. 1987. History of Regulation of Alaskan Groundfish Fisheries. NWAFC Processed Report 87-07, Fig., 25.
185 NMFS December 3, 1998 BiOp, pp. 27-28.
186 NMFS 2001 Draft PSEIS, Sec. 4.2, Fig. 14.
187 65 Fed. Reg. 3895 (January 25, 2000)
188 67 Fed. Reg. 974 (January 8, 2002)
189 NMFS 2001 raft PSEIS 4.2, p. 16 and Fig. 5.
190 *See* NMFS 1999 Draft EA/RIR to Implement Pollock RPAs, p. 112. *See also* Table 3-5A and 3-5B, pp. 117-118, Figures 3-17, 3-18, 3-19, 3-20 and 3-21, pp. 117-123.

Most of the probability centered in the range of 26% to 38% -- not 100% and not even 50%, as some industry members have claimed.

Table 11 -- Winter Bogoslof/SCA survey 30+ cm pollock biomass (metric tons) estimates in the SCA and stock assessment model EBS Age 3+ stock biomass estimates.

Winter EBS Shelf Survey 1991-1995	***Winter SCA Biomass (mt)***	***Model EBS Population* Biomass**
February 1991	477,064	5,180,000
March 1993	1,267,902	10,279,000
April 1995	680,795	8,680,000
Source: NMFS 1999 Draft EA/RIR to Implement Pollock RPAs, May 11, 1999, p. 109.		

For 2001 and 2002, the pollock regulations assume that 52% of the eastern Bering Sea pollock stock (age 3+) is found in the Sea lion Conservation Area (SCA) in the winter, thus the proposed 2002 RPA would allow the fleet to take up to 75% of the winter "A" season TAC in the SCA – the "historical" average during the 1990s.[191] However, 52% is completely at odds with the most recent 2001 winter Bogoslof/SCA survey information, which estimated only 968,000 mt of age 3+ pollock biomass in the SCA (Table 12).[192]

Table 12 -- Winter Bogoslof/SCA survey 30+ cm pollock biomass (metric tons) estimates in the SCA and stock assessment model EBS Age 3+ stock biomass estimates.

Winter EBS Shelf Survey 2001	Winter SCA Biomass (mt)	**Model EBS Population** Biomass
Feb 19-Mar 3, 2001	968,000	10,000,000

Source: Taina Honkalehto, Paul Walline, Denise McKelvey, and Neal Williamson. Echo integration-trawl survey of Walleye Pollock on the southeastern Bering Sea shelf and in the Aleutian Basin near Bogoslof Island in February and March, 2001. Preliminary Cruise Results, Acoustic-Trawl Survey of Walleye Pollock in the Southeast Bering Sea Shelf and Aleutian Basin near Bogoslof Island. Appendix 1 to the 2002 Bering Sea/ Aleutians Islands Pollock Stock Assessment (NPFMC BSAI SAFE for 2002).

[191] NMFS December 3, 1998 BiOp, p. 27: "The recent increase in BSAI critical habitat catches has occurred principally during the A-season (January-March), as evidenced by high amounts (between 250,000 and 550,000 mt) and percentages (between 50-90%) removed from critical habitat between 1992 to 1997 (Figure 18)."

[192] Taina Honkalehto, Paul Walline, Denise McKelvey, and Neal Williamson. Echo integration-trawl survey of Walleye Pollock on the southeastern Bering Sea shelf and in the Aleutian Basin near Bogoslof Island in February and March, 2001. Preliminary Cruise Results, Acoustic-Trawl Survey of Walleye Pollock in the Southeast Bering Sea Shelf and Aleutian Basin near Bogoslof Island. Appendix 1 to the 2002 Bering Sea/ Aleutians Islands Pollock Stock Assessment (NPFMC BSAI SAFE for 2002).

Since the exploitable (age 3+) biomass for the EBS pollock stock as a whole is estimated by the stock assessment model to be approximately 10 million tons, a 52% value means that 5.2 million tons (give or take) must be in the SCA during some portion of the winter. Yet the results from the 2001 winter acoustic survey indicate approximately 1 million mt in the entire SCA during that period, and it seems implausible that the expanded biomass estimate would be five times higher than the survey estimate. The assumption of 52% also fails to consider previous analyses by NMFS in the1999 EA/RIR for pollock RPAs, cited above.

Based on the available winter survey information for the Bogoslof/SCA region of critical habitat and the previous analyses in the May 1999 EA/RIR to Implement Pollock RPAs, one must conclude either that the substantial majority of the pollock stock is spawning elsewhere in the Bering Sea during the winter/early spring or that the stock assessment estimate is seriously overstating the actual biomass for the managed stock as a whole.

2.2 Gulf of Alaska pollock fishery remains temporally concentrated within fishing seasons despite quarterly and trimester allocations of TAC.

The quarterly allocation of the GOA pollock TAC which was originally imposed to address excess capacity and preemption issues in 1990, was later cited by NMFS as a sea lion conservation measure to disperse the catch temporally in order to reduce the likelihood of fishery-induced localized depletions. Notably, an ESA Section 7 consultation memo of 10 March 1993 from William Aron to Steve Pennoyer strongly opposed a proposal to adopt a two-season approach in the GOA pollock fishery to mirror the BS/AI fishery because it would increase catches in the winter roe fishery and because it would violate the strategy of temporal allocation of the fishery to avoid jeopardy:

> "The quarterly approach is fundamental to the NMFS conservation strategy of temporal and spatial allocation of the pollock TAC to minimize sea lion impacts. That NMFS took this approach was probably a fundamental reason why the U.S. District Court and the Court of Appeals found in favor of the Service in the complaint filed by Greenpeace over the 1991 walleye pollock GOA TAC. Adoption of the BSAI approach would contradict past actions by NMFS, without allowing the strategy [i.e., quarterly allocations in the GOA] sufficient time to have positive effects on the sea lion population."[193]

But the 1996 Amendment 45 to the GOA FMP subsequently reduced the seasonal allocation to trimesters and concentrated 70% of the catch in the fall and winter months, when sea lions are likely to be particularly vulnerable to nutritional stress. Under the pollock RPA rules of 1999-2000, temporal dispersion outside the January-March winter season was not achieved. In fact, pollock catches during the January-March winter period were more concentrated in 1999.[194] ***In the1999-2000 winter fishery, the TAC was***

[193] March 10, 1993 Memo from W. Aron to S. Pennoyer, ESA Section 7 consultation record
[194] NMFS 2001 Draft PSEIS, Sec. 4.2, pp. 19-20, Fig. 4.2-7

taken in a shorter period of time and daily catch rates were higher, an outcome attributed to fleet size and excess capacity.[195]

Despite a trimester allocation of the pollock fishery under pollock RPA emergency rules in 1999, the November 2000 FMP BiOp analysis of weekly catch data for the years 1995-1999 indicates that the pollock fishery remains highly concentrated temporally in brief pulses.[196] ***Dorn et al. (2000) indicated the 1999 seasonal pollock TACs in areas 610 in the western GOA and 630 in the central GOA were taken in a matter of days, while the TAC in area 620 in the Chirikof region was taken somewhat more slowly due largely to the fact that fishing grounds are not located near any port:***

> ***"The duration of pollock seasons in 1999 varied by region. In the Shumagin area, the winter, summer and fall seasons were open for 11, 6 and 6.75 days respectively. In the Chirikof area, the winter, summer, and fall seasons were open for 28, 10 and 25.5 days respectively. In the Kodiak area, the winter, summer and fall seasons were open for 7, 9 and 6.5 days respectively."***[197]

This information corroborates the statements of Gulf trawl representatives indicating that the fishing seasons occur in rapid pulses of fishing until the area and season TACs are taken for each species.[198]

2.3 Temporally concentrated fishing on pollock spawning grounds threatens the long-term productivity and sustainability of pollock stocks.

Among the unknown but potentially significant effects of fishing on genetic diversity in the North Pacific are the effects of fishing on spawning aggregations and potential loss of genetic heterozygosity from depleted localized spawning populations:

> "Genetic diversity has not been assessed under Alternative 1 [in the PSEIS by NMFS], but heavy exploitation of certain spawning aggregations can be inferred and heavier exploitation on older, more heterozygous individuals would have the tendency to reduce genetic diversity in fished versus unfished systems. Thus, some change in genetic diversity has possibly occurred in the BS/AI and GOA, but the magnitude of the impacts are not known."[199]

These potential effects on genetic diversity must be evaluated when considering the sustainability of the pollock fisheries.

In addition, the disturbance of trawl gear may have substantial effects on spawning behavior that could lower spawning potential of stocks:

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[195] NMFS 2001 Draft PSEIS, Sec. 4.2 p. 19 and Fig. 4.2-8.
[196] NMFS November 2000 FMP BiOp, Fig. 6.15b.
[197] Dorn *et al*. Assessment of the Walleye Pollock Stock in the Gulf of Alaska, p. 33. In: GOA Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2001. NPFMC, November 2000.
[198] Blackburn declaration, 2000, paragraph 6, pp. 3-4.
[199] NMFS 2001 Draft PSEIS, Sec. 4.9, p. 36.

> "Current stock assessments account for the direct effect of removals of spawning fish on spawning potential. However, fishing may disrupt spawning behavior and lower spawning potential; this possible indirect effect is not accounted for in current stock assessments. For example, Atlantic cod (Gadus morhua) were observed to exhibit specific social behaviors associated with spawning (Hutchings et al. 1999). Agonistic interactions appeared to maintain a size-based dominance hierarchy among male Atlantic cod during spawning, and interactions between sexes were dominated by males circling females. Also, large-scale changes were observed in the structure of a shoal of Atlantic cod in spawning condition, attributable to a single pass with an otter trawl (Morgan et al. 1997). This study indicated that such responses can result in persistent disturbances within the shoal over relatively large distances."[200]

NMFS' own research on pollock stocks of the North Pacific indicates that pollock exhibit natal philopatry and return to the spawning grounds of their origin despite wide-ranging summer foraging migrations.[201] While natal spawning of pollock is not proven, mark-recapture studies in Japan and the Bering Sea indicate homing to specific spawning grounds, and the persistence of spawning locations over time and repeat spawning are two elements of natal philopatry. Studies of northern cod in the Atlantic Ocean indicate the existence of genetically distinct subunits within a "stock," with major implications for the sustainability of fisheries and conventional assumptions of single-species management as practiced in the North Pacific and elsewhere:

> "…prior to the collapse of the northern cod population in the Northwest Atlantic Ocean it was believed that there was no genetically based population structure due to extensive egg and larval drift, followed by opportunistic and nonphilopatric recruitment of juveniles to adult assemblages (deYoung and Rose, 1993). Studies of allozymes and mtDNA had little success in discriminating among Northwest Atlantic cod stocks. However, Bentzen et al. (1996) examined nuclear DNA microsatellite distributions and found that the northern cod population does not represent a single panmictic assemblage, but is comprised of genetically distinguishable subunits, each of which is affiliated with a distinct spawning area. It is of great interest that considerable finestructure has been found in Atlantic cod populations, because cod and pollock have taxonomic as well as life history similarities" (FOCI 1998).[202]

If these findings hold true for pollock, the depletion of unidentified local spawning populations and their possible extinction could mean the loss of genetic adaptations to local habitat conditions, impeding recovery of the remnant population or reducing likelihood of recolonization from outside source populations that lack adaptations to local conditions.[203] Seen in this light, the possibility that the failure of Bogoslof/Aleutian Basin pollock to rebound following a moratorium on fishing after 1992 might be related to loss of adaptations to local conditions caused by overfishing cannot be ruled out.

In the absence of certainty, it should be assumed that discrete local spawning aggregations are substocks with unique adaptive characteristics that contribute to the genetic diversity and health of the stock as a whole. The FOCI research indicates that there is "considerable population structure" in

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[200] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 50.

[201] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 32.

[202] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 45.

[203] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 45.

the North Pacific, with considerable substructure within the Aleutian Islands/Basin region: "A summary view of genetic structure in walleye pollock suggests a pattern of considerable geographic stock structure."[204] Yet the existing stock assessment advice makes no mention of this information and fails to evaluate the consequences of serial depletion of spawning pollock populations for the long-term health of pollock in the North Pacific. The use of marine spawning reserves as "a sanctuary for maintenance of genetic diversity in adaptive traits"[205] would provide additional protection to spawning stocks. However, current management regulations do not provide spawning area marine reserves for groundfish stocks such as pollock in order to populations.[206]

VII. UNCERTAINTIES IN THE TAC SETTING PROCESS

NMFS describes the process of setting Total Allowable Catch (TAC) levels as the central tool for achieving the goals of target species management in the North Pacific.[207] The North Pacific Fisheries Management Council and NMFS, however, do not appropriately consider the uncertainties and unknown information inherent to stock assessments in setting total allowable catch (TAC) and acceptable biological catch (ABC) levels. Uncertainty looms large in every aspect of fisheries management. Management decisions are routinely made in the face of large uncertainties, with incomplete information. Information requirements for target species management in quota-based management systems are high, yet the fish stocks at issue cannot be individually counted. Thus, even the most basic level of information required for management such as abundance estimation is subject to large errors. The movements of the target stocks can be extensive but are not well understood due to limited survey information. Their environment is characterized by high variability from year to year, hence there is low predictability. Basic biological information on fish stocks, their significant food web, their trophic relationships, their preferred habitats and their seasonal movements are poorly understood or completely unknown.

Sources of uncertainty include fishing effects on the ecosystem, stock assessments including catch statistics (observer and survey error), biological parameters in stock assessment models (maturity, mortality, growth), and species interactions (predator-prey dynamics) and habitat needs. These sources of uncertainty in the TAC-setting process can be grouped into the following six categories:

1. quantity and quality of data
2. survey sampling method
3. stock assessment advice
4. trophic interactions
5. habitat quality
6. environmental variability

When uncertainties in the survey stock biomass estimates (on which the stock assessment models are built) are factored in with model uncertainties and uncertainties about predator-prey

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[204] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 43.
[205] David O. Conover. Darwinian Fishery Science. Mar. Ecol. Prog. Ser. 208, 2000: 303-306.
[206] S. Allen Macklin (editor). Bering Sea FOCI 1991-1997, Final Report. NOAA ERL Special Report, December 1998, p. 45.
[207] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 46.

dynamics, quality and quantity of habitat, environmental variability, etc., the risks of error are compounded. The risks and uncertainties associated with the acceptable biological catch (ABC) estimate are not adequately reflected in the current catch levels in the North Pacific.

1. Quantity and quality of data

The robustness of the current TAC-setting process is completely dependent on the quantity and quality of data.[208] Many simplifying assumptions and educated guesses are made in the single-species stock assessment models from which the overfishing level (OFL) and acceptable biological catch (ABC) are derived, in part because the data is lacking to provide better estimates of model parameters. As a result of inadequate information, the stock assessments are currently incapable of deriving the statistics required to manage target species other than the Eastern Bering Sea pollock stock in Tier 1 of the overfishing definition, under MSY; for many target species even "proxy" stock reference levels are not available.[209]

The crucial survey biomass estimates of groundfish on which stock assessments are based are only indices of abundance, not an actual census of fish, and they are subject to sampling error and large error bounds. If point estimates of biomass from the surveys do not accurately reflect trends in absolute stock size, the stock assessment model projections will only compound that error. Long term (>20 years) baseline abundance information is lacking for most species and existing survey sampling methods are not effective for all target species. Nor do survey data shed much light on the ecology and habitat requirements of target and non-target species – information that is extremely limited or completely lacking for many target species:

[208] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 46.
[209] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 74.

- Species lists from research trawl surveys indicate which species were present in the tows but provide little information on associations.[210]
- The importance of changes in temporal/spatial scales of population, e.g., seasonal migrations are not reflected in standardized surveys, which provide only a snapshot of a particular time of year.[211]
- Although biomass estimates from demersal trawl surveys provide valuable indices of the relative annual abundance of major species and species families, inadequate taxonomic keys make identification to the species level difficult for many species.[212]

Apart from surveys, the other major source of data for the stock assessment and TAC-setting process comes from the North Pacific Groundfish Observer Program.

2. Survey and measurement sampling errors

Reliable point estimates of current stock biomass are the most basic level of information required to set the maximum allowable fishing rates in the six-tiered system of criteria used in the North Pacific groundfish overfishing definitions, as expressed in Amendments 21(1990), 44 (1996), and 56 (1999) to the GOA FMP and Amendments 16 (1990), 44 (1996) and 56 (1999) to the BSAI FMP, or as they relate to the statutory definitions in the amended MSFCMA (1996).

The groundfish survey sampling method involves numerous sources of uncertainty.[213] Area-swept bottom trawl surveys, echo-integration/trawl surveys (acoustic surveys), and longline surveys are used to determine the abundance of groundfish, but the comprehensive survey strategy is limited by the frequency of the survey schedule as well as the time of year – summer for bottom trawl and longline surveys.[214] Acoustic surveys are subject to signal contamination, must be recalibrated frequently, require additional trawl survey sampling to determine echo-located species and fish size, and require that the target species is the dominant species in the water column in order to work properly.[215] Bottom-trawl survey assumptions about "catchability" (on which CPUE are based) are prone to serious error depending on whether the net is herding fish or scattering fish, and rough-bottom areas such as the Aleutian Islands and parts of the Gulf of Alaska are difficult or impossible to sample with trawl gear. Furthermore, vessel and gear disturbance may bias the survey results by changing the behavior of the fish being surveyed:

> "Fish aggregations have been observed to change location and density as a vessel passes or a trawl net approaches. Fish avoidance could create a considerable bias in acoustic estimates

[210] Walters, Gary E., and Michael J. McPhail. 1982. An Atlas of Demersal Fish and Invertebrate Community Structure in the Eastern Bering Sea: Part 1, 1978-1981. NOAA Technical Memorandum NMFS F/NWC-35. September.
[211] Walters, Gary E., and Michael J. McPhail. 1982. An Atlas of Demersal Fish and Invertebrate Community Structure in the Eastern Bering Sea: Part 1, 1978-1981. NOAA Technical Memorandum NMFS F/NWC-35. September.
[212] Fritz 1999.
[213] NMFS 2001 Draft PSEIS Secs. 2.7, 3.2 p. 59.
[214] NMFS 2001 Draft PSEIS, Sec. 2.7, pp. 60-62.
[215] NMFS 2001 Draft PSEIS, Sec. 2.7, pp. 67-68.

> of stock biomass, the composition (size and sex) of midwater trawl catches, and even the catch rates from the bottom trawl surveys."[216]

Although the survey biomass estimates are often referenced in the management process as if they were known without error, there can be little doubt that large uncertainties accompany the survey data.

Summer bottom trawl surveys in the eastern Bering Sea have been conducted annually since 1972, and triennial summer bottom trawl surveys began in the Aleutian Islands and the Gulf of Alaska in 1980, and 1984 respectively.[217] Annual winter echo integration-trawl (EIT) surveys began in 1981 in Shelikof Strait, and 1988 near Bogoslof Island, both in response to declining stocks in these regions.

The surveys are conducted

> "to assess the abundance or biomass of stocks. In addition, they also provide important information on age and sex composition, recruitment of young fish to the fished stock, length and width at age, reproductive status or condition, food habits, and other pertinent biological characteristics. Assessment of each of these parameters may be affected by sampling variability, measurement error, or systematic bias."[218]

In the stock assessment survey, an index of abundance is extrapolated from the survey results since all of the fish are not counted. The coefficients of variation for these indexes provide an estimate of the uncertainty associated with the index number. The coefficient of variation included in the stock assessment report provides some indication of the sampling variability.

In the eastern Bering Sea, which has the most frequent surveys in the North Pacific with annual summer bottom trawl surveys, over 80 species of fish are usually identified but biomass estimates are calculated for only 18 species or species groups.[219] About 140 species of fish and 200 species of invertebrates have been identified in the Aleutian Island bottom trawl survey (triennial), but survey results are summarized for only 30 fish species.[220] Point estimates of biomass are derived using the area-swept method. "The density of fish from all survey stations is averaged and extrapolated to the surveyed area of the Bering Sea to provide stock biomass estimates."[221] The surveys can only provide a rough index of abundance, and the method of extrapolation from samples is subject to large error bounds. Even in the eastern Bering Sea, the survey coefficient of variation for pollock is quite large at 23% and southeast Bering Sea pollock had a coefficient of 33%. [222] These numbers reflect the serious lack of confidence upon which significant decisions about setting ABCs and TACs are based.

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[216] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 69.
[217] Note: no pollock populations survey data exist prior to the late 1970s and early 1980s. Thus, all reported information on pollock stocks prior to this time are based on a range of analytical techniques and results vary widely.
[218] NMFS November 2000 FMP BiOp, p. 201.
[219] NMFS 2001 Draft PSEIS, Sec. 2.7 p. 62.
[220] NMFS 2001 Draft PSEIS, Sec. 2.7 p. 62.
[221] NMFS 2001 Draft PSEIS, Sec. 2.7 p. 62.
[222] NFMS 2001 Draft PSEIS Table 2.17-10, Survey Coefficient of Variation and Survey Frequency by Species and Species Group.

The stock assessment process has identified serious concerns regarding pollock about the variability around biomass estimates from the surveys.[223] For example, in the 1999 GOA triennial trawl survey, from a few hauls it was extrapolated that 72% of the survey biomass was concentrated in the Shumagin Islands, as compared to a four-survey (1984-1996) average of 41% for the Shumagin area.[224] No one knows for sure if this apparent biomass concentration is an artifact of sampling errors or whether it reflects a major shift in biomass. The GOA Plan Team broke from standard practice by recommending that the 2000 pollock ABC should be apportioned according to the four-survey average distribution, reflecting their own lack of confidence in the 1999 survey data. The 1999 Eastern Bering Sea bottom trawl survey estimated a point biomass of 3.57 million metric tons, a 61% increase relative to the 1998 estimate, but much of that increase in the bottom trawl survey may be an artifact of temperature anomalies which concentrated the fish on the outer shelf between the 100-200 m line.[225] As noted in the BS/AI SAFE for 2000 (p. 9), the increase in the stock assessment model age 3+ biomass for 1999 (7.51 million mt) was fueled by the entry of three-year-old fish from the 1996 year class and "may have been accentuated by a change in the distribution of pollock in the Bering Sea due to very cold water temperatures in 1999." The summary of the pollock SAFE chapter also notes that these temperature anomalies may have affected the availability of pollock to the survey gear and consequently may affect the biomass estimate.[226]

ABC estimates do not incorporate survey variances. Such coefficients of variation (CVs) are estimated but not formally considered in estimating acceptable catch numbers. "Estimates of the coefficient of variation (CV) for EBS and GOA pollock trawl survey biomass average 23 percent and 19 percent, respectively. The lower bound of the 90 percent confidence interval for a lognormal distribution with these CVs and median of unity is estimated at 0.688 and 0.734, respectively."[227]

It is important to recognize that the CVs reflect variability in the survey samples but do not capture variances in catchability (*q*). Catchability is an assumption about the proportion of fish in the path of the trawl that actually gets caught – an estimate of the effectiveness of the gear in catching the target fish.[228] Catchability is generally assumed to be equal to 1 (assumes everything in front of the net is caught) and effort is assumed to be a constant rather than a random variable.[229] Neither assumption is likely to be correct.[230] Laevastu and Favorite (1988) expressed great concern for the

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[223] *See e.g.,* BSAI Groundfish SAFE 2000, pp. 37, 43-44; GOA Groundfish SAFE 2000, GOA Plan Team Summary, Appendix B.
[224] GOA Groundfish SAFE for 2000, Fig. 1.7, p. 79.
[225] BSAI SAFE for 2000, pp. 43-44.
[226] BSAI SAFE for 2000, p. 37.
[227] NMFS 2001 Draft PSEIS, Sec. 4.4, p. 12.

[228] Taivo Laevastu and Felix Favorite. Fishing and Stock Fluctuations. Fishing News Books Ltd., 1988, p.61.
[229] P.T. Munro and R.Z. Hoff. 1995. Two Demersal Trawl Surveys in the Gulf of Alaska: Implications of Survey Design and Methods. NOAA Technical Memorandum NMFS-AFSC-50.
[230] P.T. Munro and R.Z. Hoff. 1995. Two Demersal Trawl Surveys in the Gulf of Alaska: Implications of Survey Design and Methods. NOAA Technical Memorandum NMFS-AFSC-50.

bias that fish avoidance introduces into survey estimates of catchability, and hence estimates of biomass:

> "Pelagic fish can be affected by ship noises. For example, mackerel shoals in the North Sea can be split into smaller concentrations by noisy ships. Olsen (1969) has show that fish do react to the presence of survey vessels and probably to echo sounders, which could cause bias in acoustic surveys. Ona and Chruickshank (1968) studied fish reactions to the entire trawling operation, using a stationary echosounder system to observe fish behavior in front of the vessel and then passage of the trawl. Strong avoidance reactions by haddock were observed, with both horizontal and vertical movements of the fish indicating that the fish density available for the bottom trawl at shallow depths may have been significantly higher than that estimated by the echo integration system on board the trawling vessel, and that avoidance of the vessel may have contributed significantly to trawl selectivity."[231]

3. Model errors

The uncertainties inherent in survey estimates of fish abundance and observer estimates of fishery catches are compounded by the uncertainties in the stock assessment models that are informed by that data. Schnute and Richards (2001) note that mathematical assumptions underlying modern fishery stock assessment models cannot be applied with high precision, and they coin the word "fishmetic" to emphasize that the "arithmetic of abundance" in stock assessment advice may not actually operate by the orderly rules of mathematics implied by the model equations:

> "The inevitable arithmetic of abundance underlies a long history of progressively complex models used to fish populations. Most of these have components that account for debits (mortality), credits (recruitment), and interest (growth). Superficially, it might appear that nothing could go wrong with such an approach, which merely captures the transactional arithmetic of a fish population. The analogy with a bank account, however, illustrates some of the potential problems. Deposits might not arrive when anticipated. Withdrawals might be incorrectly recorded or forgotten. Interest rates might change unpredictably. Currency values might fluctuate in response to a broad economy much larger than a single bank account."[232]

Schnute and Richards conclude that no fishery model can be completely trusted to capture biological reality, and they recommend treating the model-derived stock assessment advice within a management framework that recognizes the imprecision and very real risk associated with "fishmetic":

> "In summary, models begin with arithmetic, which must then be qualified by the three elements of fishmetic: process error, measurement error, and model uncertainty. The first two elements can be represented fairly rigorously through the use of probability distributions. Statistical theory then gives estimates of hidden quantities, although often with high uncertainty. The third element, however, introduces a complete unknown, not subject to

[231] Taivo Laevastu and Felix Favorite. Fishing and Stock Fluctuations. Fishing News Books Ltd., 1988, p.61.
[232] Jon T. Schnute and Laura J. Richards. Use and Abuse of Fishery Models. Can. J. Fish. Aquat. Sci. 58 (2001): 10-17.

quantification. Perhaps the proposed arithmetic was wrong in the first place. If so, all bets are off, and the seemingly rigorous statistical analyses have no real meaning."[233]

Many simplifying assumptions and educated guesses must be made in the single-species stock assessment models from which the overfishing level (OFL) and acceptable biological catch (ABC) are derived, in part because the data is lacking to provide better estimates of model parameters and in part because simplifying assumptions are easier to model. Major sources of potential error in the stock assessments involve the model parameters for natural mortality, age at maturity, fecundity, and growth, which are only a few of the hundreds of parameters in the current "state-of-the-art" population dynamics models. Assuming these parameters to be constant overstates the level of confidence in the resulting estimate of the stock conditions.

Static model estimates of natural mortality (*M*) are fraught with uncertainty yet treated as if they were known without error. When a static model estimate of natural mortality was compared with predator consumption data to test statistical catch-at-age model assumptions on constant natural mortality and the effects on biomass estimates.[234] Results showed that when other natural predators on pollock were included in the model, the estimate on natural mortality for age-2 fish doubled, and for age-3 fish it increased as much as 60%.[235] Thus single-species stock assessments are not adequately including the impact of pollock predators on natural mortality. Models that did not include these natural predators in their assessments, underestimated the uncertainty in stock biomass estimates by as much as 20%.[236] In another example, research indicates that spawning stock biomass estimates in stock assessment advice are not good indicators of viable egg production because they assume constant egg production in age classes of fish and ignore the biological, behavioral and ecological factors that directly affect egg production from year to year. If the fishes did not get adequate forage, their egg production is low.[237]

3.1 Confidence Limits and Level of Risk in Model- Estimated ABCs

The management regime does not adequately address uncertainty in model-derived point estimates of stock biomass and ABC recommendations in the stock assessment advice. The November 30, 2000 Steller Sea Lion FMP BiOp provides the following assessment of uncertainty in the stock assessment advice for eastern Bering Sea pollock:

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[233] Jon T. Schnute and Laura J. Richards. Use and Abuse of Fishery Models. Can. J. Fish. Aquat. Sci. 58 (2001): 10-17.

[234] Hollowed, Anne B., Nicholas Bax, Richard Beamish, Jeremy Collie, Michael Fogarty, Patricia Livingston, John Pope, and Jake C. Rice. 2000. Are multispecies models an improvement on single-species models for measuring fishing impacts on marine ecosystems? ICES Journal of Marine Science, 57: 707-719.

[235] Hollowed, Anne B., Nicholas Bax, Richard Beamish, Jeremy Collie, Michael Fogarty, Patricia Livingston, John Pope, and Jake C. Rice. 2000. Are multispecies models an improvement on single-species models for measuring fishing impacts on marine ecosystems? ICES Journal of Marine Science, 57: 707-719.

[236] Hollowed, Anne B., Nicholas Bax, Richard Beamish, Jeremy Collie, Michael Fogarty, Patricia Livingston, John Pope, and Jake C. Rice. 2000. Are multispecies models an improvement on single-species models for measuring fishing impacts on marine ecosystems? ICES Journal of Marine Science, 57: 707-719.

[237] *See* Beth Scott, Gudrun Marteinsdottir, and Peter Wright. Potential effects of maternal factors on spawning stock-recruitment relationships under varying fishing pressure. Can. J. Fish. Aquat. Sci. 56: 1882-1890 (1999); Gudrun Marteinsdottir, Asta Gudmundsdottir, Vilhjalmur Thorsteinsson, and Gunnar Stefansson. Spatial variation in abundance, size composition and viable egg production of spawning cod in Icelandic waters. ICES Journal of Marine Science, 57: 824-830, 2000; C. Tara Marshall, Nathalia A. Yaragina, Yvan Lambert and Olav S. Kjesbu. Total lipid energy as a proxy for total egg production by fish stocks. Nature, Vol. 402, 18 November 1999: 288-290; C. Tara Marshall, Olav Sigurd Kjesbu, Nathalia A. Yaragina, Per Solemdal, and Oyvind Ulltang. Is spawner biomass a sensitive measure of the reproductive and recruitment potential of Northeast Arctic cod? Can. J. Fish. Aquat. Sci. 55: 1766-1783 (1998).

"One stock assessment modeling format used to assess some North Pacific stocks, AD Model Builder, explicitly computes variance estimates on certain model outputs. An illustration of the variance in one model output, yield, for the EBS pollock stock was presented by Ianelli et al. (1999). Their Figure 1.26 (reproduced here as Fig. 6.4) indicates the uncertainty in expected yield under three fishing mortality rates, F_{MSY}, $F_{40\%}$, and $F_{30\%}$. Under the $F_{40\%}$ regime, the mean[238] estimated yield was 1.013 million metric tons. The 50% confidence limits for the estimate were about 0.6 mmt and 1.7 mmt. These wide confidence limits suggest that yields are estimated with uncertainty and this should be recognized by decision-makers, and incorporated into the overall management approach. Further, the analysis points out that there is about a 30% chance that harvesting at the point estimate for F would result in overfishing. Again, this analysis was performed for EBS pollock, the stock for which we have the most information. We would expect that uncertainty for other stocks to be even higher than for pollock. The use of modeling formats that permit computation of confidence limits on model outputs is encouraged, as is the explicit recognition of uncertainty in the setting of the TACs."[239]

In other words, the pollock acceptable biological catch was set at the midpoint of the probability distribution curve in FMP BiOp Fig. 6.4 and therefore had a 50-50 chance of being "right." Being "right" in this instance is understood as being at or below the target ABC value (F_{MSY} or proxy $F_{40\%}$) that reduces the stock size to a level that theoretically produces maximum sustainable yield (B_{MSY} or proxy $B_{40\%}$), which is believed to be approximately 30-40% of its unfished average stock size. Since MSY parameters for EBS pollock are uncertain, the stock currently falls into Tier 3 of the overfishing definition and the fishing mortality "target" rate is set at the slightly more conservative default rate ($F_{40\%}$), a level of fishing considered to be an approximation of F_{MSY} that aims to reduce the spawning stock size (measured as spawning per recruit) to 40% of the unfished condition.[240]

THERE IS AN EQUAL RISK OF BEING "WRONG" IN THE EXAMPLE ABOVE – I.E., OVERFISHING, OR FISHING ABOVE THE TARGET ABC LEVEL. ALTHOUGH NMFS SAYS THAT THE STOCK ASSESSMENT ABCS AND TACS ARE "CONSERVATIVE" AND TAKE UNCERTAINTY INTO ACCOUNT, CLEARLY A GREAT DEAL OF UNCERTAINTY REMAINS UNACCOUNTED FOR IN THE MODEL-GENERATED ABC POINT ESTIMATE. GIVEN THAT THE MSY-BASED "HARVEST POLICY" AIMS AT A "TARGET" (AVERAGE) STOCK SIZE 60% LOWER THAN THE AVERAGE UNFISHED SIZE, THE MARGIN FOR ERROR IS SMALL. SINCE THE STOCK IS EXPECTED TO DROP BELOW THE "TARGET" STOCK SIZE HALF THE TIME, THE MARGIN FOR ERROR IS EVEN SMALLER HALF THE TIME. WHEN UNCERTAINTIES IN THE SURVEY BIOMASS ESTIMATES OF STOCK SIZE (ON WHICH THE MODELS ARE BUILT) ARE FACTORED IN, ALONG WITH UNCERTAINTIES ABOUT THE EFFECTS OF PREDATION MORTALITY, ENVIRONMENTAL VARIABILITY, OBSERVER ERROR, ETC., THE RISK OF MAKING MISTAKES IS COMPOUNDED.

Leaving aside for the moment the question of what such a harvest policy does to competing top predators whose prey base has been reduced well below half on average, the basis for setting stock ABCs with a 50% probability of choosing the true F_{ABC} value must be seriously questioned. Would the Army Corps of Engineers build a bridge or a dam that has a 50% probability of failure? If society expects that bridges and dams should be built to standards that require a much higher probability of success, what reason justifies the lower standard in fisheries TAC-setting? The setting of fishing quotas is held to a much lower standard presumably for no good reason other than that NMFS has not deemed such things important enough to require a higher degree of certainty and a lower risk of making terrible mistakes.

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[238] Actually the median value.
[239] NMFS November 2000 FMP BiOp, p. 209.
[240] Pamela M. Mace. Relationships between Common Biological Reference Points Used as Thresholds and Targets of Fisheries Management Strategies. Can. J. Fish. Aquat. Sci., Vol. 51, 1994.

To be more precautionary and account more fully for the uncertainty in the stock assessment advice, NMFS and the Council should set the ABC value at the lower bound of a confidence limit. One example that provides a modest increase in risk aversion is the lower 50% confidence limit, as described in the FMP BiOp passage quoted above. Use of this limit to set the ABC increases the chance of being "right" to 3 out of 4 or 75%, since 75% of the probability distribution is to the right of the lower 50% confidence limit. However, setting the ABC at the lower 50% confidence limit reduces the ABC by 40% relative to the mean (actually the median) in the example shown in Figure 6.4 in the FMP BiOp, or to approximately 600,000 mt. Thus, a relatively large decrease in ABC achieves a relatively modest gain in risk-aversion. A much more risk-adverse policy would be to set the ABC at the lower 90% confidence limit, which increases the chance of being "right" to 95%, but decreases the ABC to approximately 100,000 mt, a 90% decrease in yield.

The model-generated probability distribution curve shown in FMP BiOp Fig. 6.4 succinctly illustrates levels of uncertainty associated with the stock assessment advice, and what it would cost (in terms of foregone catch) to purchase more “insurance” against overfishing, as discussed in the Draft Groundfish Programmatic SEIS (NMFS 2001):

> “AD model builder… provides a suite of statistical tools for evaluating uncertainty. Using AD model builder, it is possible to obtain confidence limits for current stock size that reflect the uncertainty in the input parameters and how well the model fits the data. These confidence limits may be rather large for many groundfish stocks.”[241]

For pollock stocks that can be assessed with AD model builder (see Draft PSEIS 2.7, Table 9), the MSC certification team should employ the AD model builder statistical tools to evaluate levels of uncertainty in the mathematical models and the risks associated with stock size and ABC recommendations under the status quo. Given all the uncertainties in the TAC-setting process and the stock assessment advice, the model probability of choosing the “correct” ABC should be far more precautionary, for instance, 90%.

4. Trophic interactions

Trophic interactions (predator/prey dynamics) are not formally considered in the stock assessment advice.[242] Using data from 1985, Livingston estimated eastern Bering Sea pollock biomass consumption for pinnipeds (257,000 mt), seabirds (272,000 mt), fishes (3.86 million mt) and the fishery (1.18 million metric tons) totaling 5.57 million metric tons in 1985.[243] Although predation on targeted commercial species by fishes, mammals and birds may have a major influence on the size of year classes of fish,[244] it is only considered to the extent that ecosystem consumption is captured

[241] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 57.
[242] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 48.

[243] P.A. Livingston. Importance of predation by groundfish, marine mammals and birds on walleye pollock, Theragra chalcogramma, and Pacific Herring, Clupea pallasi, in the eastern Bering Sea. Marine Ecology Progress Series, Vol. 102 (1993): 205-215.

[244] P.A. Livingston. Importance of predation by groundfish, marine mammals and birds on walleye pollock, Theragra chalcogramma, and Pacific Herring, Clupea pallasi, in the eastern Bering Sea. Marine Ecology Progress Series, Vol. 102 (1993): 205-215.

within an estimated natural mortality rate, *M*, in the stock assessment advice.[245] Since data on which to base a calculation of *M* are limited or absent altogether, and since stock assessment estimates of *M* are assumed to be constant for purposes of modeling population dynamics in the stock assessment, much uncertainty surrounds this estimate.[246]

The importance of managed groundfish species as food for other groundfish is rarely discussed outside the context of pollock predation on juvenile pollock in the Bering Sea, but groundfish are probably the largest consumers of target species such as walleye pollock. Livingston et al. (1985) noted that pollock is not only the most dominant groundfish species in the Bering Sea, but also an important food resource for other major components of the eastern Bering Sea groundfish complex, including Pacific cod, Greenland turbot, arrowtooth flounder, yellowfin sole and flathead sole. No attempt has been made to evaluate the potential degree of error involved in estimates of *M,* particularly for major forage species such as pollock.

5. Fishing impacts on habitat quality and the productivity of stocks

The relationship between the productivity of the target species and their habitat is unknown.[247] However, the disturbance effects of trawl gear may have substantial effects on spawning behavior that could lower spawning potential for stocks targeted during spawning:

> "Current stock assessments account for the direct effect of removals of spawning fish on spawning potential. However, fishing may disrupt spawning behavior and lower spawning potential; this possible indirect effect is not accounted for in current stock assessments. For example, Atlantic cod (Gadus morhua) were observed to exhibit specific social behaviors associated with spawning (Hutchings et al. 1999). Agonistic interactions appeared to maintain a size-based dominance hierarchy among male Atlantic cod during spawning, and interactions between sexes were dominated by males circling females. Also, large-scale changes were observed in the structure of a shoal of Atlantic cod in spawning condition, attributable to a single pass with an otter trawl (Morgan et al. 1997). This study indicated that such responses can result in persistent disturbances within the shoal over relatively large distances."[248]

This information is particularly relevant since the percentage of the pollock TAC taken in the first quarter of the year on spawning fish has mushroomed since the mid-1980s. Notably, there are no

[245] NMFS Draft Groundfish Programmatic SEIS, Section 4.2 at 5 states:

> "Single species stock assessment procedures and exploitation strategies are used to determine annual levels of catch permissible under the Magnuson-Stevens Act and consistent with NMFS's National Fishery Standards and Guidelines. For the most part, other species' prey requirements for each exploited groundfish species are considered only to the extent to which they are captured within the natural mortality rate parameter, M, one of the most difficult parameters of a fish population to measure."

[246] NMFS 2001 Draft PSEIS, Sec. 4.2, p. 5.
[247] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 51.
[248] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 50.

habitat protection measures specifically for the target species under the current management system.[249][250]

6. Effects of environmental variability on assumptions about productivity of stocks and on stock assessment advice

NMFS asserts that the magnitude of incoming year classes is highly dependent on environmental conditions, and has made numerous other references to oceanographic forcing mechanisms, implying that recruitment of exploited stocks is driven in large part by these phenomena.[251] For instance, NMFS has discussed projected pollock fishery yields for the years 2001-2005, attributing the wide range in projected yields at the 90% confidence interval to large uncertainties about near-future recruitment variability "and the degree to which this variability effects short-term yields."[252] NMFS also states that past observations and ecosystem modeling studies suggest that "climate-driven changes are responsible for a great deal of the multispecies and ecosystem level changes that have been observed" in the North Pacific.[253]

Although NMFS has discussed and speculated about the effects of environmental change on the trends in abundance of groundfish stocks and other species in the North Pacific, the agency provides no analysis of the impact of that uncertainty on stock assessment advice and makes no attempt to incorporate that uncertainty into stock assessment advice. Yet the level of uncertainty implied by random, environment-driven recruitment of groundfish stocks as a major determinant of stock size would seem to have major implications for assumptions about the ability to control spawning stock size through fishing mortality, which is a central premise of MSY theory. NMFS seems to want to have it both ways: if fishery yields are good, NMFS takes credit for wise management under conservative single-species harvest policies based on MSY. However, if a target stock declines, NMFS blames the decline on the weather and emphasizes that fishing mortality has an insignificant effect on recruitment compared to natural environmental effects.

VIII. <u>OVERFISHING</u>

1. The MSY-based harvest policy fails to prevent overfishing in both the single-species and ecosystem contexts.

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[249] THE ESSENTIAL FISH HABITAT (EFH) GUIDELINES STATE THAT ECOLOGICAL RELATIONSHIPS AMONG SPECIES AND BETWEEN SPECIES AND THEIR HABITAT REQUIRE AN ECOSYSTEM APPROACH IN DETERMINING THE EFH OF A MANAGED SPECIES OR SPECIES ASSEMBLAGE. 50 CFR 600.815(A)(2)(II)(E). THE TIERED SYSTEM OF EFH DESIGNATION (LEVELS 1-4) IS DESIGNED TO REFLECT DIFFERENT LEVELS OF INFORMATION ABOUT MANAGED SPECIES. LEVEL 1 INFORMATION IDENTIFIES GEOGRAPHIC RANGE. 50 CFR 600.815(A)(2)(I)(C)(1-4). YET THE NORTH PACIFIC COUNCIL CREATED A NEW LEVEL 0, WHICH IMPLIES NOT ONLY THAT UNCERTAINTY IS HIGH BUT ALSO THAT IGNORANCE IS COMPLETE FOR MANY LIFE STAGES OF MANY TARGET SPECIES.

[250] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 53.

[251] NMFS 2001 Draft PSEIS, Sec. 4.4, p. 12.

[252] NMFS 2001 Draft PSEIS, Sec. 4.4, p. 2 and Tables 4.4-2, 4.4-4.

[253] NMFS 2001 Draft PSEIS, Sec. 3.9, p. 17.

Under the current U.S. fishery management system, managers seek to maximize yield on a sustainable basis,[254] in accordance with the maximum sustainable yield (MSY) overfishing provisions of the Magnuson Stevens Fishery Conservation and Management Act (MSFCMA). The MSFCMA defines the terms "overfishing" and "overfished" to mean a rate or level of fishing mortality that jeopardizes the ability of an exploited fish stock (or mixed-stock complex) to produce MSY on a continuing basis.[255] In the simplest terms, MSY is "the largest catch which the stock can sustain, on average, over a long period of time (given current environmental conditions)."[256] The key reference levels for MSY are the rate of fishing mortality that will theoretically yield MSY (F_{MSY}) and the stock size that will theoretically produce MSY (B_{MSY}) if one has been fishing at F_{MSY} over a long period. It sounds like a straightforward concept, but in the Final Rule on National Standard Guidelines NMFS cautions that MSY is very difficult to achieve for a variety of reasons and deems it "a theoretical concept rather than an empirical one."[257]

In the North Pacific FMPs, the MSY based overfishing definition is implemented using a harvest control rule comprised of six tiers, in which stocks are managed based on the information known about a specific stock.[258] The North Pacific overfishing definition operates on a sliding scale determined by the amount of information available for each target stock or "stock complex." Although the goal is to manage exploited stocks by MSY in Tier 1 as more information becomes available over time, only the eastern Bering Sea pollock stock is deemed to have sufficient information to determine reliable MSY parameters (F_{MSY}, B_{MSY}).[259] In the absence of reliable MSY reference stock levels, the population dynamics of an exploited fish stock (or mixed-stock complex) can only be inferred by examining average recruitment distributions over a time series of survey and fishery data. In other words, there is no baseline knowledge of the population dynamics of most fished stocks in the North Pacific, only a running average. Hence uncertainty about stock dynamics is very high and the risks associated with proxy MSY overfishing levels are correspondingly higher.

Tiers 2 through 4 require, at a minimum, "reliable" point estimates of biomass (B) and greater or lesser combinations of proxy-MSY reference values (e.g., $F_{40\%}$, $B_{40\%}$). The maximum allowable "harvest" rate in Tiers 2-4 is $F_{40\%}$, a fishing mortality rate considered somewhat more conservative than F_{MSY} that aims to reduce spawning biomass per recruit to 40% of its expected value (on average) in the absence of fishing.[260][261] For stocks in tiers 5 and 6, information to determine proxy-MSY values is not available at all. In Tier 5, point estimates of biomass (*B*) and natural mortality (*M*) are considered sufficiently well known to set the overfishing level (OFL) = *M* and the maximum permissible exploitation rate (F_{ABC}) is set at .75 x *M* as a "precautionary" downward adjustment from the maximum fishing

[254] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 42.
[255] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 38.
[256] FMP Amendments 56/56.
[257] NMFS 1998, 63 Fed. Reg. 24215-24216: "The difficulty of estimating MSY is a significant problem that will require the best efforts of NMFS and the Councils to solve."
[258] FMP Amendments 56/56.
[259] Even the EBS pollock acceptable biological catch (ABC) is still based on Tier 3 criteria, owing to uncertainty in MSY parameters: "Estimates of reference points related to maximum sustainable yield (MSY) are currently available. However, the extent of their reliability is questionable." See BSAI SAFE report for 2000, p. 53.
[260] Witherell, David, and James Ianelli. 1997. A Guide to Stocks Assessment of the Bering Sea/Aleutian Islands Groundfish.
[261] $F_{40\%}$ may be more "conservative" than MSY, but NMFS fails to consider whether this rate of fishing applies to all species across the board, regardless of their life history strategies. For slow-growing, long-lived species, for instance, such a rate of fishing may not be "conservative" at all.

level. In Tier 6, so little is known that OFL = the average catch over some period of time for which catch history is known.

A telling indication of the difficulties associated with managing wild stocks of fish by MSY is the fact that NMFS manages only one stock in the North Pacific in Tier 1 of the overfishing definition, which requires extensive information to formulate MSY parameters. Most stocks are managed under the "proxy" $F_{40\%}$ harvest policy because the level of information required to determine MSY is lacking: "the methodologies presently used to conduct most stock assessments are not capable of deriving the statistics required by the Tier 1 definitions."[262] The level of information required for this system of management, the difficulty of acquiring it, the level of uncertainty associated with it, and the difficulty of achieving MSY are central features of the TAC-setting and management process.

In the 2001 draft programmatic SEIS for the Alaska groundfish fisheries, NMFS states that the single-species $F_{40\%}$ fishing strategy in the North Pacific FMPs satisfies the precautionary criteria of the MSFCMA's National Standard Guidelines for overfishing:

> "Tiers 1-6 satisfy the first characteristic of a precautionary approach by placing a substantial buffer between OFLs and the annual ABC. Tiers 1-3 satisfy the second characteristic of a precautionary approach by decreasing fishing mortality rates for stocks that fall below the MSY level (or, in the case of Tier 3, for stocks that fall below a reference level somewhat higher than the MSY level). Tier 1 satisfies the third characteristic of a precautionary approach by reducing the target fishing mortality rate in direct relation to the level of uncertainty regarding the stock's productive capacity (i.e., greater uncertainty leads to a lower target fishing mortality rate)."[263]

According to NMFS, the National Standard criteria for a "precautionary approach" to setting target reference points for overfishing levels were modeled on the North Pacific groundfish Fishery Management Plan overfishing definitions and have three features:

(1) Target reference points should be set safely below limit reference points.
(2) A stock that is below its MSY level should be harvested at a lower rate than if the stock were above its MSY level.
(3) Criteria used to set target catch levels should be explicitly risk averse, so that greater uncertainty regarding the status or productive capacity of a stock corresponds to greater caution in setting target catch levels.[264]

Witherell et al. (2000) cite the application of these criteria as evidence of precautionary management in the North Pacific because MSY is treated as a limit and the "target" stock size is somewhat more conservative than the maximum allowable fishing rate (F_{MSY}, or proxy $B_{35\%}$):

> ". . . maximum sustainable yield (MSY) is treated as a limit, rather than a target. For most stocks, ABC is based on a rate less than or equal to $F_{40\%}$, which is the fishing mortality rate associated with 40% of the equilibrium level in the absence of fishing."[265]

[262] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 74.
[263] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 73.
[264] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 72.

A fishing mortality level that is marginally more conservative than the maximum allowable under MSY is no guarantee that overfishing will not occur even in a single-species context. This is in part because the estimates of stock biomass are uncertain and subject to large error bounds which can be compounded by modeling parameter errors in the stock assessment advice and other sources of uncertainty over which managers have no control, such as environmental variability and predator-prey dynamics. The effect on competing top predators and the food web of fishing at a level that seeks by design to reduce fully exploited spawning stocks by 60% on average is not considered in the process of setting single-species ABCs. Status quo ABC-setting and TAC-setting in the management of the North Pacific groundfish fisheries does not incorporate the needs of predators or other ecosystem-level considerations into conventional single-species catch levels.[266] "The ABCs have generally been developed using single-species stock assessment philosophies . . . which maximize yield while preventing overfishing of each [managed] species, but do not explicitly account for trophic interactions with other taxa."[267]

> "Single species stock assessment procedures and exploitation strategies are used to determine annual levels of catch permissible under the Magnuson-Stevens Act and consistent with NMFS's National Fishery Standards and Guidelines. For the most part, other species' prey requirements for each exploited groundfish species are considered only to the extent to which they are captured within the natural mortality rate parameter, M, one of the most difficult parameters of a fish population to measure."[268]

Each allowable catch level considers only that target species, treated largely in isolation from its relation to the ecosystem: ". . . single species approach to setting allowable catches largely ignores interactions between a target species and its competitors, predators, and prey."[269]

A key assumption of an MSY or MSY-proxy (e.g., $F_{40\%}$) fishing strategy is that any recruitment of juvenile fish to the adult spawning stock above the theoretical replacement line necessary to maintain the adult population at a given stock size is a "surplus" for the fishery. However, strictly speaking, there is no surplus production in marine ecosystems, as noted in the November 2000 Steller sea lion FMP BiOp.[270] Similarly, the Bering Sea Ecosystem report concluded that the impact of the single-species exploitation strategy on competitors in the ecosystem is likely to be significant, contrary to the conventional MSY "surplus" assumption employed by fisheries managers:

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[265] David Witherell, Clarence Pautzke, and David Fluharty. An ecosystem-based approach for Alaska groundfish fisheries. ICES Journal of Marine Science, 57: 771-777 (2000).
[266] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 48.
[267] Lowell W. Fritz, Richard C. Ferrero and Ronald J. Berg. The Threatened Status of Steller Sea Lions, *Eumetopias jubatus*, Under the Endangered Species Act: Effects on Alaska Groundfish Fisheries Management. Marine Fisheries Review 57(2), 1995: pp. 14-27.
[268] NMFS 2001 Draft PSEIS, Sec. 4.2, p. 5.
[269] Robert C. Francis, Kerim Aydin, Richard L. Merrick, and Stephen Bollens. Modeling and Management of the Bering Sea Ecosystem. In: Dynamics of the Bering Sea, Thomas R. Loughlin and Kiyotaka Ohtani, Eds., University of Alaska Sea Grant, AK-SG-99-03, 1999, pp. 425-426.
[270] NMFS November 2000 FMP BiOp, pp. 208, 223-224.

> "Management of marine fish harvests is largely based on assumptions of maximum sustainable yield models. It is assumed that fishing will reduce the standing stock of fish such that there is a density-dependent increase in productivity, resulting in a harvestable surplus. Under the sustainable yield model, the annual biomass increment that is removed by fishing will be replaced the following year as a result of the growth of surviving fishes and the recruitment of new individuals to the population. It is also assumed that changes in the abundance of the target fish population as a result of fishing have no impact on the abundance of competitors in the system. That is not likely to be a reasonable assumption in most situations, and is not an ecosystem-based approach as described in Chapter 2."[271]

In short, single-species fishery exploitation rates are designed to out-compete the other parts of the ecosystem that contribute to natural mortality (*M*) for a particular species.[272] The goal of the MSY-based harvest policy is to remove fish before they are "lost" to natural mortality by other ecosystem consumers.[273] Nowhere does NMFS demonstrate that the $B_{40\%}$ or $B_{35\%}$ "target" level of stock biomass is a "conservative" rebuilding target for the stock, much less a sustainable level of fishing mortality in an ecosystem context. Nor does NMFS consider setting the target stock biomass level at a higher level (e.g., $B_{50\%}$, $B_{75\%}$, $B_{90\%}$), along with corresponding minimum stock size threshold (MSST) values, in order to avoid the uncertainties and ecological risks associated with the conventional MSY reference levels.

The problem facing NMFS and the North Pacific Council is that there is no clear policy framework or procedure within the conventional single-species management regime for considering non-economic values and adjusting single-species fishing strategies to address impacts on food webs, protected species, habitats, etc. Even if the exploited pollock stocks were able to withstand the single-species $F_{40\%}$ exploitation strategy under existing regulations, that does not mean that other pollock predators in that food web can thrive under such a regime. Fishing rates and levels of catch that are deemed "conservative" relative to the conventional MSY yardstick may have considerable peripheral impacts on food webs and habitats that are not reflected in a simple comparison of catch to the estimated "biomass" of a target stock in the status quo TAC-setting process. Moreover, the assumption of "surplus" fails to consider overfishing in an ecosystem context.

2. CCAMLR "decision rule" for krill: overfishing defined in an ecosystem context

The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) differs from conventional approaches to marine resource management in that the CCAMLR treaty is concerned not only with the regulation of fishing but also with conservation of the whole ecosystem.[274] The "ecosystem approach" of CCAMLR is reflected in Article II of the Convention, which sets out basic principles under which all harvesting and associated activity in the Convention Area shall be conducted:

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[271] National Research Council, The Bering Sea Ecosystem, National Academy Press, Washington D.C., 1996, p. 212.
[272] NMFS 2001 Draft PSEIS, Sec. 4.2, p. 5.
[273] NMFS November 2000 FMP BiOp, p. 225: "In effect, fisheries remove fish from the population before they are 'lost' to natural mortality (e.g., other consumers of groundfish)."
[274] Graeme Parkes. CCAMLR's Application of the Precautionary Approach. In V.R. Restrepo (Editor), Proceedings of the Fifth National NMFS Stock Assessment Workshop: Providing Scientific Advice to Implement the Precautionary Approach Under the Magnuson-Stevens Fishery Conservation and Management Act, pp. 87-95. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-40.

> "The CCAMLR has adopted a conservation approach that seeks to (i) prevent any harvested population from falling below the level that ensures the greatest net annual increment to stable recruitment; (ii) maintain the ecological relationships between harvested, dependent, and related populations of Antarctic living marine resources; (iii) restore depleted populations; and (iv) prevent or minimize the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades."[275]

The CCAMLR ecosystem approach recognizes that uncertainty is high and that regulation of human activities requires a highly precautionary approach that seeks to avoid deleterious changes in Antarctic ecosystems rather than to mitigate damages after the fact:

> "*An ecosystem approach does not concentrate solely on the species fished also seeks to minimize the risk of fisheries adversely affecting 'dependent and related species,' that is, the species with which humans compete for food. However, regulating large and complex marine ecosystems is a task for which we currently have neither sufficient knowledge nor adequate tools. Instead, CCAMLR's approach is to regulate human activities (e.g. fishing) so that deleterious changes in the Antarctic ecosystems are avoided*"[276]

CCAMLR's precautionary approach is guided by policy priorities in the face of large scientific uncertainties, in which the benefit of the doubt goes to the krill predators in the ecosystem. The precautionary approach is made operational in the TAC-setting process by setting fishing levels in a manner that effectively reverses the burden of proof. An example of the implementation of this approach is seen in the harvest policy for the important forage species krill (*Euphausia superba*). The first step of the krill decision rule, as in the current U.S. TAC-setting process, is to set the single-species yield level according to the single-species criteria, the goal being to have no greater than a 10% probability of the spawning stock falling below $B_{20\%}$. This biomass target stock size is arrived as follows:

> "*If only krill were to be taken into account, an appropriate target level for this ratio in terms of conventional fisheries management might be 50% [$B_{50\%}$]. On the other hand, the best situation for the predators would be no fishing at all, i.e., a ratio of 100% [$B_{100\%}$].*"[277]

Thus, the logical *next step is to propose a way in which the needs of krill-dependent species can be taken into account*. Since a reliable quantitative model of fishery impacts on predators is not possible at this time, an "ad hoc approach" was adopted and a *preliminary target stock size halfway between the single-species $B_{50\%}$ target stock size and the stock size without fishing ($B_{100\%}$) was chosen, that is, 75% of unfished stock size ($B_{75\%}$):*

> "THE COMMISSION FOR THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES (CCAMLR) TAKES THE NEEDS OF KRILL INTO ACCOUNT IN AN INDIRECT MANNER WHEN RECOMMENDING THE ANNUAL KRILL CATCH LIMIT. THIS IS DONE USING A SINGLE SPECIES MODEL TO ESTIMATE THE SIZE OF THE KRILL POPULATION (RELATIVE TO ITS PRE-EXPLOITATION SIZE) AFTER A 20-YR PERIOD OF HARVESTING AT A GIVEN INTENSITY. THE LEVEL OF HARVESTING INTENSITY IS ADJUSTED UNTIL THE MEDIAN KRILL SPAWNING BIOMASS IS PREDICTED TO BE 75% OF ITS MEDIAN PRISTINE SIZE."[278]

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[275] Sherman, Kenneth, 1990, Productivity, Perturbations, and Options for Biomass Yields in Large Marine Ecosystems, Chapter 16 In: K. Sherman, L. Alexander, and R. Gold (eds.), Large Marine Ecosystems: Patterns, Processes and Yields. AAAS.
[276] Karl-Hermann Kock (editor), Understanding CCAMLR's Approach to Management, May 2000, p. 7. Online: www.ccamlr.org.
[277] Karl-Hermann Kock (editor), Understanding CCAMLR's Approach to Management, May 2000, p. 8.
[278] Thomson, R.B., D.S. Butterworth, I.L. Boyd, and J.P. Croxall. 2000. Modeling the Consequences of Antarctic Krill Harvesting on Antarctic Fur Seals. Ecological Applications, 10(6), pp. 1806-1819.

This management action to address trophic impacts of fishing was taken in the absence of certainty about the needs of krill predators, in a precautionary manner:

> "In the absence of any suitable information on the needs of krill predators, this 75% figure was chosen simply because it lies halfway between 100% (i.e., no krill fishery) and 50% (the optimal depletion level suggested by the commonly used Schaeffer surplus production model . . ."

The krill yield management decision rule is highly relevant to NMFS's conclusion that North Pacific groundfish "harvest policy" ($F_{40\%}$) is reasonably likely to reduce significantly the availability of prey to other components of the ecosystem, such as Steller sea lions.[279] Currently there is no Step 2 in the North Pacific groundfish TAC-setting process. In other words, the CCAMLR approach effectively shifts the burden of proof from the ecosystem to the fishery by aiming to extract no more than 25% of the stock on average, whereas the North Pacific policy places the burden of proof on the ecosystem by aiming to take 60% on average.

The current management of the pollock fisheries fails to achieve true sustainability because it does not address overfishing an ecosystem context, recognizing the central importance of pollock in the North Pacific food web. Leaving the majority of fish in the water is a far more precautionary approach to risk-taking in the face of large uncertainties in information and about the effects of management actions. Lacking that, the current management of pollock in the North Pacific fails to ensure that adverse effects on the pollock food web are avoided.

3. The North Pacific overfishing definition fails to establish a legal MSST for the pollock stocks.

Despite the problems with the MSY harvest policy as discussed above, the current groundfish regulatory regime centers around MSY. Within the MSY framework, however, there are problems with the minimum stock size threshold (MSST) for pollock.

For pollock, Pacific cod and Atka mackerel, the "Global Control Rule" identified in the RPA measure in the FMP BiOp was designed to prevent stocks from falling below the point at which jeopardy and adverse modification would occur -- i.e., 40% of unfished biomass.[280] NMFS determined that, so long as fish stocks stay above a point equivalent to 40% of their unfished level, then the overall amount of fishing will not cause jeopardy and adverse modification to Steller sea lions. The FMP BiOp RPA contemplated a control rule more stringent than the status quo. However, the RPA in the BiOp on Steller sea lion protection measures maintains the status quo regime, except the fishing would stop entirely if a stock dropped to the 20% level.[281] In effect, this 20% level functions as a minimum stock size threshold. This control rule, however, does not suffice as a legal MSST because it is at a level that is too low to avoid overfishing.[282] At a minimum, fishing should be stopped when the stock reaches MSY or drops to the 40% level.

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[279] NMFS November 2000 FMP BiOp, p. 225.
[280] NMFS November 2000 FMP BiOp, p. 273.
[281] NMFS October 2001 RPA Biop, pp. 24-25.
[282] For a complete discussion of why this control rule is not adequate to avoid jeopardy to Steller sea lions, s*ee* Plaintiff's Memorandum in Support of Motion for Summary Judgment in Civ. No. C98-0492Z.

The National Standard Guidelines state that "[e]ach FMP must specify, to the extent possible, objective and measurable status determination criteria for each stock or stock complex covered by that FMP and provide an analysis of how the status determination criteria were chosen and how they relate to reproductive potential."[283] The Guidelines then explain that such "status determination criteria must specify" both a " maximum fishing mortality threshold" and a "minimum stock size threshold," or a "reasonable proxy" for each.[284] Such criteria "must be expressed in a way that enables the Council and the Secretary to monitor the stock or stock complex and determine annually whether overfishing is occurring and whether the stock or stock complex is overfished."[285]

The Federal Register notice that accompanies the Guidelines explains why NMFS determined that these two standards are necessary:

> "Section 303(a)(10) of the Magnuson-Stevens Act requires the specification of status determination criteria and sections 304(e)(1) and 304(e)(2) state that these criteria are to be used for the purpose of determining which fisheries are in need of action 'to end overfishing' and 'to rebuild affected stocks of fish.' The only way that both needs ('end overfishing' and 'rebuild affected stocks') can be addressed is if the status determination criteria include measures appropriate to each -- namely one measure pertaining to the rate of fishing mortality and another measure pertaining to the size of the stock. That is, if only a maximum fishing mortality threshold were specified, it would be possible to determine which fisheries require action to end overfishing, but it would not be possible to determine which fisheries require action to rebuild affected stocks. Conversely, if only a minimum stock size threshold were specified, it would be possible to determine which fisheries require action to rebuild affected stocks, but it would not be possible to determine which fisheries require action to end overfishing."[286]

Thus, although the phrase "minimum stock size threshold" does not appear in the Magnuson-Stevens Act itself, that phrase represents NMFS' interpretation that such a threshold is one of the necessary "objective and measurable criteria for identifying when the fishery . . . is overfished" required by section 303(a)(10).[287]

The Guidelines state that biomass threshold should be set as follows:

> "To the extent possible, the stock size threshold should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock complex were exploited at the maximum fishing mortality threshold specified under paragraph (d)(2)(i) of this section. Should the actual size of the stock

[283] 50 C.F.R. § 600.310(d)(2).
[284] 50 C.F.R. § 600.310(d)(2).
[285] 50 C.F.R. § 600.310(d)(2).
[286] 63 Fed. Reg. 24212, 24218 (May 1, 1998).
[287] 16 U.S.C. § 1853(a)(10).

or stock complex in a given year fall below this threshold, the stock or stock complex is considered overfished."[288]

The establishment of MSST at ½ B_{msy}, however, is inconsistent with the MSFCMA. Fishery scientists generally accept that when overfishing is defined in the context of MSY, MSY serves as the threshold for determining overfishing.[289] Congressional direction on overfishing fits well with the scientific definition. The MSFCMA directs federal fishery managers to "prevent overfishing while achieving, on a continuous basis, the optimum yield from each fishery."[290] Consistent with the scientific consensus, the MSFCMA defines "optimum yield" as maximum sustainable yield (MSY) reduced by relevant economic, social, or ecological factors.[291] Overfishing occurs when the "rate or level of fishing mortality [] jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis."[292] Given the stated intent of Congress and the common usage among fishery scientists, MSY thus should serve as a threshold in determining whether a stock is overfished or experiencing overfishing. NMFS, however, has failed to institute such a threshold in the FMPs for the BSAI and GOA.

Numerous provisions of the MSFCMA support the conclusion that NMFS must set minimum biomass levels at B_{msy} as part of the overfishing determination criteria in FMPs. First, the MSFCMA defines the terms "overfishing" and "overfished" to "mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis."[293] This provision contemplates that NMFS must set the minimum biomass level for a given stock at the point below which the stock will no longer be capable of producing MSY on a continuing basis. Obviously, if NMFS allows stock biomass to drop below the MSY level, the stock is not producing MSY on a continuing basis. In other words, because a biomass that is smaller than B_{MSY} is by definition inconsistent with sustaining harvest at optimum yield on a continuing basis, a biomass below B_{MSY} is overfished. On the other hand, so long as NMFS considers the factors relevant to achieving optimum yield, and the biomass never dips below B_{MSY}, harvests can be sustained at OY on a continuing basis. Thus, the absolute floor at which the agency may set minimum biomass levels is B_{MSY}.

Second, section 304(e) requires the Secretary to both "end overfishing" and "to rebuild affected stocks of fish."[294] The Act uses a biomass criterion to determine when a stock is approaching an overfished condition.[295] Again, Congress indicated in this section that when the size of the fishery resource falls below the level capable of supporting fishing at MSY, the stock is overfished and must be rebuilt to the appropriate minimum biomass level, or B_{MSY}.

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[288] 63 Fed. Reg. at 24230.
[289] *See* C.W. Clark, Mathematical Bioeconomics: The Optimal Management Of Renewable Resources (John Wiley & Sons 1990).
[290] National Standard 1, 16 U.S.C. § 1851(a)(1).
[291] Id. § 1802(28)(B).
[292] Id. §1802(29).
[293] Id.
[294] *See e.g.,* id. § 1854(e)(2).
[295] Id. § 1854(e)(1) ("A fishery shall be classified as approaching a condition of being overfished . . . based on trends in fishing effort, fishery resource size, and other appropriate factors . . .).

Third, the "rebuilding" goal in the MSFCMA, as expressed within the definition of "optimum yield," is B_{MSY}.[296] The Secretary's listing then triggers his duty to prepare a rebuilding plan to restore the stock to B_{MSY}.[297] Thus, the FCMA contemplates that a stock becomes "overfished" when its biomass level falls below B_{MSY}, because below that level, the stock cannot produce MSY on a continuing basis. NMFS must therefore identify overfished stocks and implement conservation and management measures to rebuild them to B_{MSY}.[298] Congress meant for the listing and rebuilding provisions to ensure that overfished stocks will be rebuilt to levels where they can continue to produce at MSY.

Fourth, National Standard 1 of the MSFCMA requires that all FMPs contain "[c]onservation and management measures [that] shall prevent overfishing while achieving, on a continuing basis, the optimum yield. . . ." [299]In turn, the MSFCMA's definition of "optimum yield" establishes MSY as a limit above, which the yield cannot grow. [300] Thus, in order to achieve Congress' goal of optimum yield on a continuing basis without overfishing, all fish stocks must be maintained above their minimum biomass levels, and overfished stocks must be recouped to minimum biomass levels consistent with maximum sustainable yield, or B_{MSY}.

Fifth, because the MSFCMA requires NMFS to manage stocks for optimum yield, which the agency must derive in part by reducing MSY to take account of ecological factors such as natural variability in stock size, overfishing criteria in FMPs should incorporate a biomass buffer consistent with accounting for those factors.[301] In fact, to account for such variables, the agency's own Technical Guidance sets a fishing default rate intended to result in a biomass level that is approximately 125% to 131% of the B_{MSY}.[302] Thus, management for optimum yield, as the MSFCMA requires, will provide for a cushion of 25% to 31% above the minimum biomass level consistent with achieving MSY, or B_{msy}.

Finally, NMFS treats B_{MSY} as a limit for purposes of fishing rate,[303] and there is no reason why the agency should interpret the statute differently for purposes of biomass level. If the agency considers overfishing to occur whenever the rate of fishing exceeds that which will produce MSY, it follows that, once the biomass drops below B_{MSY}, then overfishing has occurred. It is simply inconsistent to treat MSY as a "limit" for purposes of fishing rate, but to only consider it a "target" for purposes of biomass level.

4. The overfishing definition fails to address the "sliding baseline" syndrome.

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[296] Id. § 1802(28)(C) ("[optimum yield] in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery"); accord National Standard Guidelines, Final Rule, (NS1 Comments), Response to Comment 1, 63 Fed. Reg. at 24215 ("MSY. . . is established as the initial target for rebuilding an overfished stock or stock complex. . . .").
[297] 16 U.S.C. §§ 1802(28)(C), 1854(e)(3)-(4).
[298] Id. § 1854(e)(2).
[299] Id. § 1851(a)(1).
[300] Id. § 1802 (28)(B) ("[optimum yield] is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor"); accord National Standard Guidelines, Final Rule, (NS1 Comments), Response to Comment 1, 63 Fed. Reg. 24212, 24215 (May 1, 1998) ("MSY now constitutes an upper limit on optimum yield (OY), ..."); V.R. Restrepo, et al., Tech. Guidance, at 13 ("A target biomass level for stocks that require rebuilding could be the biomass that would produce MSY. . . . [In the FCMA,] OY corresponds to a target level, but is constrained to be less than or equal to MSY.").
[301] *See* id. § 1802(28)(B).
[302] *See* V.R. Restrepo, et al., Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act, Preprint Draft (Tech. Guidance) 35 (1998) (discussing stock size associated with target control rule of 0.75 F_{MSY}).
[303] *See* David Witherell, Clarence Pautzke, and David Fluharty. An ecosystem-based approach for Alaska groundfish fisheries. ICES Journal of Marine Science, 57: 771-777, 2000.

Under the status quo, stocks or stock "complexes" in the North Pacific can be fished as low as 5% of $B_{40\%}$ (proxy B_{MSY}), or about 2% of the theoretical unfished, equilibrium spawning stock biomass, before NMFS will stop fishing. In reality none of the exploited stocks has reached that absolute nadir, according to survey data and model estimates of biomass. By definition stocks managed in Tiers 3-6 lack reliable MSY parameters (F_{MSY}, B_{MSY}) or a reference level of equilibrium spawning stock biomass in the absence of fishing ($B_{100\%}$). The proxy B_{MSY} "target" spawning stock biomass is set at $B_{40\%}$ for most stocks in this category. If the stock biomass drops below the $B_{40\%}$ "target" level, the $F_{40\%}$ rate is adjusted downward slightly according to the criteria of Tier 3b of the overfishing definition. Since $B_{40\%}$ is an average and a "target," rather than a threshold not to be exceeded, it is expected that the stock biomass will drop below $B_{40\%}$ half the time. This approach is inconsistent with the requirements of the Magnuson-Stevens Act.

However, $B_{40\%}$ is also a sliding baseline based on some time series of stock size estimates (B) and average recruitment distributions gleaned from the survey and fishery data series. In other words, $B_{40\%}$ is a running average, not a baseline reference level of stock size in the sense that "unfished equilibrium" is intended as a stock reference level in MSY theory. Thus the $B_{40\%}$ is a moving target that declines as the stock declines, thereby allowing fishing to continue indefinitely up to the point where there is almost no spawning stock biomass remaining (5% of $B_{40\%}$, 2% of $B_{100\%}$) under the status quo, albeit at lower and lower levels in proportion to the dwindling stock size. In Tiers 3-6 of the overfishing definition, there is no baseline (equilibrium) reference stock size level, but only a running average derived from the available time series of survey abundance data. Thus, any MSST becomes a sliding baseline as well, since it is derived by reference to a $B_{40\%}$ level that is changing with the size of the stock.

NMFS explains the problem with a sliding baseline, highlighting the decline of Greenland turbot as an example:

> "Violations of the assumption that recruitment can be modeled as a random draw from a stationary distribution could lead to overestimation of expected future recruitment and an underestimation of vulnerability to continued fishing. If recruitment is a function of stock size, or if it exhibits a declining trend over time, then the stock may not be sufficiently protected under the existing management scheme. Recall that the status of each stock is evaluated annually relative to its estimated unfished level (B_{NF}). Recall also that B_{NF} is estimated by applying constant values for somatic growth and natural mortality to observed recruitment for each age class, and then summing the expected biomass of each age class for the year in question. Importantly, B_{NF} is a function of recruitment under this approach. If recruitment is declining for any reason (e.g. as a function of stock size or some unexplained temporal trend, then B_{NF} will also decline. Thus, the standard by which stock status is determined could decline as the stock itself declines. The case of Greenland turbot illustrates the potential for such a "sliding" standard. For this stock, recruitment has declined over time [ ] in a fashion that appears to be related to stock size [ ]. Estimated values of B_{NF} for this species have also declined over time, so that the ratio of the stock biomass to B_{NF} has remained unchanged in spite of a significant decline in the stock biomass over the past 15 years [ ]. That is, the status of Greenland turbot has been determined by comparing the size of the stock with a standard that declines with stock size. Thus, it appears that, at least for some stocks, recruitment may

> not be reliably and accurately modeled as a random draw from a stationary distribution based on previous observations. Therefore, the existing management strategy may not be sufficiently protective in those cases where recruitment exhibits a pattern as a function of stock size or time."[304]

For example, MSY parameters are unknown for Gulf of Alaska pollock. The $B_{40\%}$ target stock size under an $F_{40\%}$ exploitation strategy (the "harvest policy") is based on average recruitment for all years (1964-1998). The GOA pollock spawning biomass at the beginning of 2001 was projected to be 204,600 tons, which is well below the model estimate of $B_{40\%}$ (250,000 tons).[305] The "proxy" reference value for B_{MSY} under tier 3 of the overfishing definition is $B_{35\%}$, 216,000 mt. Thus, the projected 2001 spawning biomass was below $B_{40\%}$ and the "proxy" B_{MSY} reference level stock size. Lost in the haze of this technical jargon, however, is the fact that the 2000 Shelikof Strait EIT survey biomass estimate of 334,900 mt was the lowest in the time series and only about 12% of the biomass estimate in 1981.[306] Thus, GOA pollock proxy MSY parameters such as $B_{40\%}$ and $B_{35\%}$, based on average recruitment for all years in the time series of data, fail to reflect the 88% decline in Shelikof spawning biomass since the fishery began in earnest after 1980. See Table 1 for Shelikof Strait Pollock Biomass Estimates and Gulf of Alaska SSL Trend Counts, 1976-2000.

Whether this nadir is within the range of natural fluctuation between high and low stock sizes, or the result of twenty years of steady fishing pressure under an MSY-like strategy, or some combination of both factors, the fact remains that the stock survey biomass has declined nearly 90% in twenty years and is experiencing a period of record-low biomass in the survey and model time series. Yet the stock is not considered "overfished" due to the sliding baseline syndrome.

IX. IMPORTANCE OF POLLOCK IN THE NORTH PACIFIC FOOD WEB

1. Pollock Has Been Recognized as a Major Forage Fish in the North Pacific for Over a Century

Walleye pollock (*Theregra chalcogramma*) is one of the most abundant species in the North Pacific, accounting for as much as 50-70% of the estimated groundfish biomass in the eastern Bering Sea and ranking second abundance in the Gulf of Alaska. The genus *Theragra* is translated as "beast food," from the Greek *Ther* = beast, *agra* = prey or food, in recognition of pollock's importance to marine predators such as the northern fur seal since at least the 19th century.[307,308,309] Jordan and

[304] NMFS November 2000 FMP BiOp, p. 211 (references to figures ommitted).
[305] NPFMC. 2000. GOA Stock Assessment and Fishery Evaluation for 2001. Dorn et al.
[306] NPFMC. 2000. GOA Stock Assessment and Fishery Evaluation for 2001. Dorn et al., Table 1.5
[307] Jordan, David Starr, Leonhard Stejneger, and Frederic A. Lucas. 1896. Observations on the fur seals of the Pribilof Islands, Preliminary Report. Washington Government Printing Office.
[308] A. B. Alexander. Observations During A Cruise on the Dora Siewerd, August-September, 1895. In: Seal and Salmon Fisheries and General Resources of Alaska, Vol. IV. Washington, D.C., Govt. Printing Office. 1898.
[309] David Starr Jordan, Leonard Stejneger, Frederic Augustus Lucas, and George Archibald Clark. Second Preliminary Report of the Bering Sea Fur Sea Investigations, Government Printing Office, 1898.

Evermann (1898, 1902) characterized pollock as "Excessively common throughout the Bering Sea, swimming near the surface, and furnishing the greater part of the food of the [northern] fur seal."[310] Thus pollock's importance to the North Pacific food web has been recognized for more than a century.

All evidence indicates that predation on pollock by marine mammals, many seabirds, and many fishes in the North Pacific is extensive. As noted by NMFS in the North Pacific Groundfish Draft Programmatic SEIS (NMFS 2001), juvenile pollock is the dominant fish prey in the eastern Bering Sea.[311] Researchers have concluded that pollock occupy a key position in the ecosystem, transmitting energy from zooplankton to larger predatory fishes and numerous birds and mammals.[312] In all, at least fifteen species of marine mammals, thirteen species of seabirds, and ten fish species are known or believed to feed to a greater or lesser extent on walleye pollock at either juvenile or adult phases of pollock's life history.

- Using data from 1985-1988, Livingston (1993) estimated total groundfish consumption of eastern Bering Sea pollock ranging from 3.86 million metric tons in 1985 (following the appearance of a large 1984 year class) to 920,000 metric tons in 1988.[313]
- Major fish predators of pollock include some of the most valuable commercial groundfish species in the North Pacific. In the Bering Sea, groundfish predators of pollock include adult pollock, arrowtooth flounder, Pacific halibut, Greenland turbot, flathead sole, as well as Pacific cod, sablefish, Pacific sandfish, some sculpins, and Alaska skate.[314] In the Gulf of Alaska, pollock was the dominant prey in every year of sampling of groundfish food habits in the 1990s, consumed by Pacific halibut, sablefish, and larger Pacific cod (>70 cm FL), larger arrowtooth flounder (>40 cm FL), shortspine thornyhead, flathead sole, and great sculpin (but not adult pollock).[315]
- Although the pollock fishing industry recently has cast doubt on the nutritional value of pollock to Steller sea lions, Laevastu and Larkins (1981) estimated that annual pollock consumption by marine mammals in the eastern Bering Sea was comparable to the commercial catch at that time. Major marine mammal predators of pollock include endangered Steller sea lions, depleted northern fur seals and Pacific harbor seals, as well as ringed seals and spotted seals, in addition to fin, minke and humpback whales, Dall's porpoises, and others.[316] Overall, 19 of 27 marine mammal species that occur in the Bering Sea are reported to prey on gadid fish species, dominated by pollock.[317]
- Seabird predators of pollock include large breeding colonies of black-legged kittiwake, common murre, thick-billed murre, tufted puffin, horned puffin, pigeon guillemot, pelagic

[310] D.S. Jordan and B.W. Evermann. American Food and Game Fisheries, A Popular Account of All the Species Found in America North of the Equator. Doubleday, Page and Co., 1902. 572 pp. See also: Jordan, D.S., and B.W. Evermann. The fishes of North and Middle America: a descriptive catalogue of the species of fish-like vertebrates found in the waters of North America north of the Isthmus of Panama. Bull. U.S. Natl. Mus. No. 47, 1898.
[311] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 3.
[312] Kei-ichi Mito, Akira Nishimura, and Takashi Yanagimoto. Ecology of Groundfishes in the Eastern Bering Sea, with Emphasis on Food Habits. In: Dynamics of the Bering Sea, T.R. Loughlin and K. Ohtani, eds., University of Alaska Sea Grant, AK-SG-99-03, 1999: pp. 537-580.
[313] P.A. Livingston. Importance of predation by groundfish, marine mammals and birds on walleye pollock, *Theragra chalcogramma*, and Pacific herring, *Clupea pallasi*, in the eastern Bering Sea. Marine Ecology Progress Series, Vol. 102 (1993): 205-215.
[314] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 6 and Table 3.3-3.
[315] M-S. Yang and M.W. Nelson. Food Habits of the Commercially Importance Groundfishes on the Gulf of Alaska in 1990, 1993, and 1996. NOAA Tech. Memo. NMFS-AFSC-112. February 2000
[316] NMFS 2001. Draft PSEIS, Sec. 3.3, p. 6.
[317] Michael A. Perez and Thomas R. Loughlin. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, 1985, (1986) pp. 357-392.

cormorant, marbled murrelet, Kittlitz's murrelet, ancient murrelet, and parakeet auklet.[318] Tufted and horned puffins at the Semidi and Shumagin Islands (western Gulf of Alaska) consume juvenile pollock in moderate amounts, and tufted and horned puffin pollock consumption is heavy at the Sandman Reefs (western Gulf of Alaska).[319]

Table 13 summarizes commonly identified pollock predators, based on available food habits studies across the North Pacific:

Table 13 -- Summary of walleye pollock predators in the North Pacific

Marine Mammals	Seabirds	Fishes
Northern fur seal, *Callorhinus ursinus*	tufted puffin, *Fratercula cirrhata*	Pacific halibut, *Hippoglossus stenolepsis*
Steller sea lion, *Eumetopias jubatus*	horned puffin, *F. corniculata*	Greenland turbot, *Reinhardtius hippoglossoides*
Pacific harbor seal, *Phoca vitulina richardsii*	black-legged kittiwake, *Rissa tridactyla*	Flathead sole, *Hippoglossoides elassodon*
Spotted seal, *P. largha*	red-legged kittiwake, *R. brevirostris*	arrowtooth flounder, *Atheresthes stomias*
ribbon seal, *P. fasciata*	common murre, *Uria aalge*	sablefish, *Anoplopoma fimbria*
ringed seal, *P. hispida*	thick-billed murre, *U. lomvia*	Pacific cod, *Gadus macrocephalus*
	northern fulmar, *Fulmarus glacialis*	sculpin, *Cottidae* spp.
harbor porpoise, *Phocoena phocoena*	pigeon guillemot, *Cepphus columba*	Pacific sandfish, *Trichodon trichodon*
Dall's porpoise, *Phocoenoides dalli*	pelagic cormorant, *P. pelagicus*	Alaska skate, *Bathyraja parmifera*
Pacific white-sided dolphin, *Lagenorhynchus obliquidens*	short-tailed shearwater *Puffinus tenuirostris*	shortspine thornyhead, *Sebastolobus alascanus*
fin whale, *Balaenoptera physalus*	marbled murrelet, *B. marmoratus*	walleye pollock, *Theragra chalcogramma*
sei whale, *B. borealis*		
minke whale, *B. acutorostrata*		
humpback whale, *Megaptera novaeangliae*		
Killer whale, *Orcinus orca*		
beluga whale, *Delphinapterus leucas*		

[318] T.R. Loughlin, Irina N. Sukhanova, Elizabeth H. Sinclair, and Richard C. Ferrero. Summary of Biology and Ecosystem Dynamics of the Bering Sea. In: Dynamics of the Bering Sea, T.R. Loughlin and Kiyotaka Ohtani, eds. University of Alaska Sea Grant. Fairbanks, 1999.
[319] S. A. Hatch, and G. A. Sanger. Puffins as samplers of juvenile pollock and other forage fish in the Gulf of Alaska. Mar. Ecol. Prog. Ser. 80 (1992): 1-14.

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Byrd, G. Vernon, Richard L. Merrick, John F. Piatt, and Brenda L. Norcross. 1997. Seabird, Marine Mammal, and Oceanography Coordinated Investigations (SMMOCI) Near Unimak Pass, Alaska: An Ecosystem Approach to Monitoring. USFW/Alaska Maritime National Wildlife Refuge, January 1997.
Frost, Kathryn J. and Lloyd F. Lowry. 1986a. Sizes of walleye pollock, Theragra chalcogramma, consumed by marine mammals in the Bering Sea. Fishery Bulletin: Vol. 84, No. 1, 1986.
Frost, Kathryn J. and Lloyd F. Lowry. 1986b. Marine Mammals and Forage Fishes in the Southeastern Bering Sea. Prepared for: Forage Fishes in the Southeastern Bering Sea, a workshop sponsored by MMS, 4-5 November 1986.
Hatch, S.A. and G.A. Sanger. 1992. Puffins as samplers of juvenile pollock and other forage fish in the Gulf of Alaska. Mar. Ecol. Prog. Ser. 80:1-14.
Hunt, G.L. Jr., A.S. Kitaysky, M.B. Decker, D.E. Dragoo, A.M. Springer. 1996. Changes in the distribution and size of juvenile walleye pollock, Theragra chalcogramma, as indicated by seabird diets at the Pribilof Islands and by bottom trawl surveys in the eastern Bering Sea, 1975 to 1993. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop "The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems," Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).
LGL Alaska Research Associates, Inc. 1991. Marine Birds and Mammals of the Unimak Pass Area: Abundance, Habitat Use and Vulnerability. OCS Study MMS 91-0038.
Lowry, Lloyd F., Kathryn J. Frost, and Thomas R. Loughlin. 1988. Importance of Walleye Pollock in the Diets of Marine Mammals in the Gulf of Alaska and Bering Sea, and Implications for Fishery Management. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, November 1988. Alaska Sea Grant Report 89-1. June 1989.
Lowry, L.F., V.N. Burkanov, K.J. Frost. 1996. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop "The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems," Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).
Michael A. Perez and Thomas R. Loughlin. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, 1985, (1986), pp. 357-392.
Springer, A.M. 1992. A Review: Walleye Pollock in the North Pacific -- How Much Difference Do They Really Make? Fisheries Oceanography, Vol. 1:1.

Clearly pollock is a key forage species in the North Pacific, perhaps the keystone forage species in the eastern Bering Sea food web as well as a top-ranked forage fish in the Gulf of Alaska. Additionally, the proportion of pollock in the diet of the increasing stock of eastern Steller sea lions in Southeast Alaska is quite high, indicating the widespread importance of this species across the Alaska region.[320] Other important forage fishes include Pacific herring (*Clupea pallasi*), capelin (*Mallotus villosus*), and Pacific sand lance (*Ammodytes hexapterus*), as well as Atka mackerel in the western and central Aleutian Islands, but none are thought to approach pollock in abundance.

Of the five gadid species found in the North Pacific, the prolific walleye pollock is by far the most abundant and most widely preyed upon. Steller sea lions, northern fur seals, Pacific harbor seals, ringed seals and spotted seals are all major consumers of pollock in western Alaska. Overall, 19 of 27 marine mammal species that occur in the Bering Sea are reported to prey on gadid fishes,

[320] NMFS November 2000 FMP BiOp, p. 136; Fig. 4.5.

compared to 20 of 27 in the North Sea.[321] Table 14 summarizes the relative importance of gadid fishes in marine mammal diet studies from the Bering Sea, based on limited information for many of the predator species:

Table 14 -- Relative Importance of Gadid Fishes in the Bering Sea

	Arctic Cod	Saffron Cod	Pacific Cod	Pacific Tomcod	Walleye Pollock
Pinnipeds:					
Steller sea lion	5	2	1	3	1
Northern fur seal	4	4	2	4	1
Harbor seal	5	2	1	2	1
Spotted seal	1	1	4	4	1
Ringed seal	1	1	4	4	3
Ribbon seal	1	2	5	4	1
Bearded seal	3	2	4	4	3
Cetaceans:					
Minke whale	1	1	5	4	3
Sei whale	3	4	4	4	3
Fin whale	2	2	2	4	2
Humpback whale	3	3	3	5	3
Killer whale	5	5	5	5	5
Harbor porpoise	5	1	5	5	5
Dall's porpoise	4	4	4	4	3
Beluga	1	1	4	4	1
Sperm whale	4	4	4	4	3
Giant bottlenose whale	4	3	4	4	3

1=major prey item; 2= minor, but common; 3=minor, but uncommon;
4=not known as prey; 5=insufficient data.

Source: Michael A. Perez and Thomas R. Loughlin. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, 1985, (1986), pp. 357-392.

Jordan et al. (1898) found that fur seals on the Pribilof Islands were eating large quantities of pollock and squid in the 1890s:

> "...it may be said that the examination of several hundred stomachs shows that the food of the fur seal in the Bering Sea consists mainly of squid, Alaskan pollock, and a small, smelt-like fish unknown save through bones obtained from the seals. The squid is no direct value to

[321] Michael A. Perez and Thomas R. Loughlin. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, 1985, (1986) pp. 357-392.

man, the pollock has never been taken for economic purposes, and the "seal-fish" never taken by man."[322]

Alexander (1898) found that squid and pollock predominated in most stomach samples collected from fur seals killed in the pelagic fur seal hunt of the 1890s in the southeastern Bering Sea.[323] Food habits data gathered over the decades since 1950 have consistently shown pollock to be a major prey of northern fur seals during the breeding and pup-rearing months (May-October) on the Pribilof Islands.[324]

Limited food habits information is available for Steller sea lions and harbor seals prior to the 1970s, but collections of specimens since the 1940s have generally shown pollock to be a top prey fish for both species.[325] Although opportunistic rookery-only sampling of sea lions in the late-1950s and

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322 David Starr Jordan, Leonard Stejneger, Frederic Augustus Lucas, and George Archibald. Second Preliminary Report of the Bering Sea Fur Seal Investigations, Washington, D.C., Govt. Printing Office. 1898.

323 A. B. Alexander. Observations During A Cruise on the Dora Siewerd, August-September, 1895. In: Seal and Salmon Fisheries and General Resources of Alaska, Vol. IV. See Tables, p. 600. Washington, D.C., Govt. Printing Office. 1898.

324 Wilke, Ford, and Karl W. Kenyon. 1952. Notes on the Food of the Fur Sea, Sea-Lion, and Harbor Porpoise. Journal of Wildlife Management, Vol. 16, No. 3, July; Fiscus, Clifford H., Gary A. Baines, and Ford Wilke. 1962. Pelagic Fur Seal Investigations, Alaska Waters. U.S. DOI/FWS, Special Scientific Report -- Fisheries No. 475; Sinclair, Elizabeth, Thomas Loughlin, and William Pearcy. 1994. Prey Selection by northern fur seals (*Callorhinus ursinus*) in the eastern Bering Sea. Fishery Bulletin 92: 144-156; Sinclair, Elizabeth H., George A. Antonellis, Bruce W. Robson, Rolf R. Ream, and Thomas R. Loughlin. 1996. Northern fur seal, Callorhinus ursinus, Predation on Juvenile Walleye Pollock, Theragra chalcogramma. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop "The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems," Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).

325 Imler, R. H., and H. R. Sarber. 1947. Harbor seals and sea lions in Alaska. U.S. Fish Wildl. Serv., Spec, Sci. Rep. 28, 23 p.; Wilke, Ford, and Karl W. Kenyon. 1952. Notes on the Food of the Fur Sea, Sea-Lion, and Harbor Porpoise. Journal of Wildlife Management, Vol. 16, No. 3, July; Pitcher, Kenneth W. 1980. Food of the Harbor Seal, Phoca vitulina richardsi, in the Gulf of Alaska. Fishery Bulletin: Vol. 78, No. 2: pp. 544-549; Pitcher, Kenneth W. 1981. Prey of the Steller Sea Lion, Eumetopias jubatus, in the Gulf of Alaska. Fishery Bulletin: Vol. 79, No. 3: 467-471; Lowry, Lloyd F., Kathryn J. Frost, Donald G. Calkins, Gordon L. Swartzman, and Susan Hills. 1982. Feeding Habits, Food Requirements, and Status of Bering Sea Marine Mammals. Final Report to the North Pacific Fishery Management Council, Contract No. 81-4, 290; Kajimura, Hiroshi, and Charles W. Fowler. 1984. Apex predators in the walleye pollock ecosystem in the eastern Bering and the Aleutian Islands regions. In: D.H. Ito (ed.), Proceedings of the Workshop on Walleye Pollock on its Ecosystem in the EBS. NOAA Tech. Memo. NMFS F/NWC-62; Perez, Michael A., and Thomas R. Loughlin. 1985. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, pp. 357-392; Frost, Kathryn J., and Lloyd F. Lowry. 1986. Marine Mammals and Forage Fishes in the Southeastern Bering Sea. Prepared for: Forage Fishes in the Southeastern Bering Sea, A Workshop Sponsored by Minerals Management Service, November 4-5; Calkins, D.G., and E. Goodwin. 1988. Investigation of the declining sea lion population in the Gulf of Alaska. Alaska Department of Fish and Game. 76 pp.; Lowry, L.F., K. J. Frost, and T. R. Loughlin. 1988. Importance of walleye pollock in the diets of marine mammals in the Gulf of Alaska and Bering Sea, and implications for fishery management, pp. 701-725. In Proceedings of the international symposium on the biology and management of walleye pollock, Nov. 14-16, 1988, Anchorage, Alaska. Alaska Sea Grant Rep. 89-1; Alaska Sea Grant. 1993. Is It Food? Addressing Marine Mammal And Seabird Declines. Report 93-01. Workshop Summary; NMFS 1995; Merrick, Richard L. and Donald G. Calkins. 1996. Importance of Juvenile Walleye Pollock, Theragra chalcogramma, in the Diet of Gulf of Alaska Steller Sea Lions, Eumetopias jubatus. In: U.S. Dep. Commer. NOAA Tech. Rep. NMFS 126, pp. 153-166; Sinclair and Zeppelin, in press.

1960s[326] shows a mixed diet containing little pollock, biases in sampling (summer only, rookeries only, and predominance of territorial males) may account for the apparent absence of pollock in collections from that period.[327] Since the 1970s, studies from various times of year and areas consistently have shown pollock to be a top-ranked sea lion and harbor seal prey throughout Alaska except in the western-central Aleutian Islands, where Atka mackerel becomes the dominant finfish biomass and the dominant prey species of sea lions.

2. Pollock Fishery Competition with Marine Mammals and Seabirds

Available evidence from other regions of the world indicates that large-scale removals of marine fish biomass have significant short-term and long-term effects on food webs, habitats and the community of species in exploited marine ecosystems, and that they can be ecosystem-altering in their cumulative effect.[328] The Report to Congress of the Marine Ecosystem Principles Advisory Panel

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[326] Thorsteinson, Fredrik V., and Calvin J. Lensink. Journal of Wildlife Management, Vol. 26, No. 4, October 1962: pp. 353-359; Mathisen, Ole A., Robert T. Baade, and Ronald J. Lopp. 1962. Breeding Habits, Growth and Stomach Contents of the Steller Sea Lion in Alaska. Journal of Mammalogy, Vol. 43, No. 4: 469-477; Fiscus, C.H., and G.A. Baines. 1966. Food and feeding behavior of Steller and California sea lions. Journal of Mammalogy, 47, pp. 195-200.

[327] Pitcher, Kenneth W. 1981. Prey of the Steller Sea Lion, Eumetopias jubatus, in the Gulf of Alaska. Fishery Bulletin: Vol. 79, No. 3: 467-471.

[328] See e.g., Ainley, David G., Harriet R. Huber, and Kevin M. Bailey. 1982. Population fluctuations of California sea lions and the Pacific whiting fishery off central California. Fishery Bulletin: Vol. 80, No. 2, pp. 253-258; Overholtz, William J., and Albert V. Tyler. 1985. Long-term Responses of the Demersal Fish Assemblages of Georges Bank. Fishery Bulletin: Vol. 83, No. 4; Sherman, Kenneth, and Alfred M. Duda. 1999. Large Marine Ecosystems: An Emerging Paradigm for Fishery Sustainability. Fisheries Vol. 24, No. 12: pp. 15-26; Parsons, T.R. 1992. The Removal of Marine Predators By Fisheries and the Impact of Trophic Structure. Marine Pollution Bulletin, Volume 25, 1-4: pp. 51-53; Apollonio, Spencer. 1994. The use of Ecosystem Characteristics in Fisheries Management. Reviews in Fisheries Science, Vol. 2(2): 157-180; Hutchings, Jeffrey A., and Ransom A. Myers. 1994. What can be learned from the collapse of a renewable resource: Atlantic cod, Gadus morhua, of Newfoundland and Labrador. National Research Council Canada, NRC-CNRC, Vol. 51, No. 9, pp. 2126-2146; Pauly, D., and V. Christensen.1995. Primary production required to sustain global fisheries. Nature 374: 255-257; Dayton, Paul K., Simon F. Thrush, M. Tundi Agardy, and Robert J. Hofman. 1995. Viewpoint: Environmental Effects of Fishing. Aquatic Conservation: Marine and Freshwater Ecosystems, Vol. 5: pp. 205-232; National Research Council. 1996. The Bering Sea Ecosystem. Committee on the Bering Sea Ecosystem, Polar Research Board, Commission on Geosciences, Environment and Resources. National Academy Press, Washington, D.C., 307 pp.; Hutchings, Jeffrey A. 1996. Spatial and temporal variation in the density of the northern cod and a review of hypotheses for the stock's collapse. Can. J. Fish. Aquat. Sci. 53: 943-962; Roberts, Callum M. 1997. Ecological advice for the global fisheries crisis. TREE Vol. 12, No. 1, pp. 35-38; Hilden, Mikael. 1997. Conflicts between fisheries and seabirds – management options using decision analysis. Marine Policy, Vol. 21, No. 2, pp. 143-153; Steneck, Robert. 1997. Fisheries-Induced Biological Changes to the Structure and Function of the Gulf of Maine. Maine/New Hampshire Sea Grant Program. Reprinted from the Proceedings of the Gulf of Maine Ecosystem Dynamics Scientific Symposium and Workshop, RARGOM Report 91-1, 18 pp.; Botsford, L.W., J.C. Castilla, and C.H. Peterson. 1997. The management of fisheries and marine ecosystems. Science 277: 509-515; Auster. Peter J., Les Watling, and Alison Rieser. 1997. Comment: The Interface Between Fisheries Research and Habitat Management. North American Journal of Fisheries Management 17: 591-595.; Fritz, Lowell W. 1998. Do Trawl Fisheries Off Alaska Create Localized Depletions of Atka Mackerel (Pleurogrammus monopterygius)? Appendix 1-1, In: Draft EA/RIR for an Amendment to the BS/AI FMP to Reapportion Total Allowable Catch of Atka Mackerel and Reduce Fishery Effects on Steller Sea Lions. NMFS, May 8; Orensanz, J.M. (Lobo), Janet Armstrong, David Armstrong, and Ray Hilborn. 1998. Crustacean resources are vulnerable to serial depletion – the multifaceted decline of crab and shrimp fisheries in the Greater Gulf of Alaska. Reviews in Fish Biology and Fisheries; Pauly, D., V. Christensen, J. Dalsgaard, R. Froese, and F. Torres, Jr. 1998. Fishing down marine food webs. Science 279: 860-863; Fogarty, Michael J., and Steven A. Murawski. 1998. Large-

(EPAP 1999)[329] concluded that large-scale marine fisheries can be expected to have top-down structuring effects on exploited marine ecosystems, much as any natural predator would exert control on the system:

> "Fishing can be viewed as a keystone predator; the ecological effects of fishing are therefore substantially greater and more complex than simply the biomass removed. Thus, we should expect that substantial changes have or could occur in those ecosystems due to fishing. We have witnessed changes in the landscape around us with the advent of technology evolved from the axe and the plow. We should expect equally profound ecological changes from modern, large-scale uses of the hook and net."[330]

Over twenty years ago the final Environmental Impact Statement for the Bering Sea/Aleutian Islands Fishery Management Plan (1981) recognized the potential for conflict between large-scale commercial pollock fisheries and large populations of pollock predators in the North Pacific, recognizing the problem as "especially acute with respect to the more than 2 million pinnipeds that inhabit the Bering Sea and Aleutians, particularly the northern sea lion and the northern fur seal." The National Research Council's Bering Sea Ecosystem report concluded on the basis of the temporal and geographic pattern of fishing that fishery effects on sea lion and harbor seal prey availability are the only causal factor considered to have a high likelihood of explaining the declines in western Alaska. That report further suggested that indirect and cumulative effects of large-scale groundfish fisheries in the Bering Sea are a significant limiting factor in the recovery of declining top predator populations:

> "It seems extremely unlikely that the productivity of the Bering Sea ecosystem can sustain current rates of human exploitation as well as the large populations of all marine mammal and bird species that existed before human exploitation -- especially modern exploitation -- began."[331]

is tantamount to saying that the current levels of fisheries removals are reducing carrying capacity and inhibiting recovery of wildlife competitors at the top of the food chain. The Bering Sea Ecosystem

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Scale Disturbance and the Structure of Marine Systems: Fishery Impacts on Georges Bank. Ecological Applications, 8(1) Supplement, pp. S6-S22; Watling, Les, and Elliott A. Norse, 1998. Disturbance of the Seabed by Mobile Fishing Gear: A Comparison to Forest Clearcutting. Conservation Biology, Vol. 12, No. 6, December, 1998: 1180-1197; Ecosystem Principles Advisory Panel (EPAP). 1999. Ecosystem-Based Fishery Management: A Report to Congress by the Ecosystem Principles Advisory Panel. David Fluharty (Chair), Pete Aparicio, Christine Blackburn, George Boehlert, Felicia Coleman, Philip Conkling, Robert Costanza, Paul Dayton, Robert Francis, Doyle Hanan, Edward Houde, James Kitchell, Rich Langton, Jane Lubchenco, Marc Mangel, Russell Nelson, Victoria O'Connell, Michael Orbach, Michael Sissenwine, Ned Cyr, David Detlor, and Alicon Morgan; National Research Council. 1999. Sustaining Marine Fisheries. Committee on Ecosystem Management for Sustainable Marine Fisheries. National Academy Press, Washington, D.C. 164 pp.; Hutchings, Jeffrey A. 2000. Collapse of Marine Fisheries. Nature, Vol. 406, pp. 882-885; NMFS November 2000 FMPBiOp; McConnaughey, R.A., Kathy Mier, and C.B. Dew. 2000. An examination of chronic trawling effects on soft-bottom benthos of the eastern Bering Sea. ICES Journal of Marine Science, 57: 1377-1388.

[329] The reauthorized Magnuson-Stevens Fishery Conservation and Management Act, also known as the "Sustainable Fisheries Act" of 1996, Sec. 406, tasked NMFS with convening a panel to develop recommendations "to expand the application of ecosystem principles in fishery conservation and management activities." 16 U.S.C. 1882. The report to Congress of the Ecosystem Principles Advisory Panel (EPAP 1999) recommends an ecosystem-based management approach for fisheries.

[330] Ecosystem Principles Advisory Panel 1999, p. 10.

[331] National Research Council. The Bering Sea Ecosystem. National Academy Press, Washington, D.C., 1996: p. 4.

report recognized that "*ultimately fishing will have to be reduced*" if the goal is to have abundant marine mammal and bird predators in the long-run. In short, to improve ecosystem carrying capacity for top predators, the National Marine Fisheries Service must leave more prey in the water.

Fishery managers in the North Pacific have largely ignored the ecosystem effects of fishing down exploited stocks under the MSY-based $F_{40\%}$ harvest policy. Although the appearance of the apparently large 1996 pollock year class in the eastern Bering Sea has temporarily boosted the EBS pollock abundance (but not Bogsolof or Aleutian Islands pollock) and led managers to recommend the highest TAC levels in the history of the domestic fishery, the stock size is estimated to be only 45% of its unfished equilibrium abundance in 2002 and indices of year-class strength do not indicate another strong cohort since then. The fishery impacts on pollock predators of repeatedly targeting and rapidly fishing down occasional large year classes are not considered in the single-species TAC-setting process. Larger year classes of pollock appear to sustain higher levels of predation, perhaps because superabundance triggers a stronger predator response. Predators can reasonably be expected to benefit from these irregular surges of prey abundance. These "bumper crop" cohorts of pollock may be important to the survival of year classes of many seabirds and marine mammals in the North Pacific.

The management regime has not addressed the fundamental contradiction between a single-species exploitation strategy aimed at reducing spawning stocks to a fraction of their unfished size, on the one hand, and the legal obligation to ensure the food supplies of protected species such as the endangered Steller sea lion and the depleted northern fur seal, on the other – both of whom rely on commercially exploited species such as walleye pollock.

2.1 Impacts of the Pollock Fishery on Marine Mammals

In western Alaska, Steller sea lion populations have plummeted 80-90% since the 1970s and northern fur seals and Pacific harbor seals have experienced population declines of greater than 50%. Both sea lions and fur seals have suffered steady declines in pup production. Fur seal pup count estimates on the Pribilof Island, St. Paul and St. George combined, have declined steadily from over half a million in 1950 to less than 180,000 in 2000 despite the end of commercial seal hunting in 1968.[332] The 2000 pup count was the lowest since 1921, when the population was badly depleted by the commercial hunt. Sea lion pup counts in the endangered western Alaska stock have shown similar trends since the 1970s, with sharp declines of 19% during 1994-1998.

It appears that there is a serious food availability problem for declining pinniped populations in western Alaskan waters, and reproduction in Steller sea lions and fur seals is particularly vulnerable to food shortages.[333] Concerns about the impacts of the groundfish fisheries for pollock and other

[332] Anne York, NMML, personal communication, 29 November 2000.

[333] Kenneth W. Pitcher, Donald G. Calkins, and Grey W. Pendleton. "Reproductive performance of female Steller sea lions: an energetics-based reproductive strategy?" Can. J. Zool. 76: 2075-2083 (1998). "Costa (1993) discussed the relationship between reproductive and foraging energetics in pinnipeds. He characterized the otariid [family of sea lions and fur seals] breeding pattern as 'energetically expensive. Otariids have longer lactation periods and rely on food resources adjacent to the rookery or haulout site where the pup is located and must make many feeding trips. Otariid reproductive patterns are optimal for situations where prey are concentrated and predictable. When environmental conditions are good, otariids are able to transfer large amounts of energy to their offspring resulting in high survival rates and productive populations. However, during periods when food resources are scarce, this reproductive/foraging strategy appears to make otariids particularly vulnerable and result in low population productivity. They are still constrained to the area near the terrestrial site where their nursing offspring is located, but may be unable to obtain enough energy to support that offspring, maintain a fetus and their own condition. This may be particularly true for a species like Steller sea lions which nurse their offspring up to one year and beyond."

species were identified long before NMFS concluded that the major fisheries jeopardize Steller sea lions in 1998 and 2000. Steller sea lions, northern fur seals and Pacific harbor seals were identified as at-risk species due to their large consumption of commercially exploited fishes, particularly pollock, and their distribution in heavily fished areas. A 1982 report to the North Pacific Fisheries Management Council cited large increases in catches of Bering Sea pollock and other groundfish from 12,500 tons in the early 1950s to over 2.2 million tons in the early 1970s and specifically noted that large-scale groundfish fishery removals may reduce the environment's carrying capacity for Steller sea lions.[334] Table 15 provides information on the relative importance of pollock in the diet of marine mammals in the eastern Bering Sea, suggesting which species are most vulnerable to the direct effects of pollock fishery competition:

Table 15 -- Relative Importance of Pollock in the Diet of Marine Mammals in the Eastern Bering Sea

Predators	Pollock	Fish and Squid	Remarks
Northern sea lion	Major	Major	Capable of consuming all sizes
Northern fur seal	Major	Major	Capable of consuming all sizes
Largha (spotted) Seal	Minor	Major	Consume principally juveniles <20 cm length
Harbor seal	Major	Major	Capable of consuming all sizes
Ribbon seal	Major	Major	Consume principally juveniles <20 cm length
Ringed seal	Minor	Major	Consume principally juveniles <20 cm
Bearded seal	Minor	Major	Consume principally juveniles <20 cm
Minke whale	Minor	Major	Probably <30 cm length
Sei whale	Minor	Major	Probably <30 cm length
Fin whale	Major	Major	<30 cm length
Humpback whale	Minor	Major	30-40 cm length
Dall's porpoise	Minor	Major	Probably <40 cm length
Kajimura, Hiroshi, and Charles W. Fowler. 1984. Apex predators in the walleye pollock ecosystem in the eastern Bering and the Aleutian Islands regions. In: D.H. Ito (ed.), Proceedings of the Workshop on Walleye Pollock on its Ecosystem in the EBS. NOAA Tech. Memo. NMFS F/NWC-62.			

2.1.1 Impacts of the pollock fisheries on Steller sea lions

From a historical and cumulative perspective, it is difficult to avoid the conclusion that the big factory fisheries have replaced Steller sea lions as the top finfish predator in many areas of western Alaska. Throughout the period of sea lion decline, massive trawl fisheries have operated in areas of former sea lion abundance, targeting prime sea lion prey and becoming increasingly concentrated in prime Steller sea lion foraging habitat since 1980. Steller sea lions have had major direct interaction with the trawl fisheries over the years. Thousands of sea lions died from being entangled in trawl gear during the 1960s through the 1980s when sea lion numbers were much higher. Total incidental takes of sea lions in the foreign and joint-venture trawl fisheries have been variously estimated at 20,000 to

[334] Lowry, L. F., D. G. Calkins, G. L. Swartzman, and S. Hill. 1982. Feeding habits, food requirements and status of Bering Sea marine mammals. Document submitted to North Pacific Fisheries Management Council, Nov. 1, 1982, p. 148.

50,000 animals during this time period.[335] Sea lions remain the largest source of marine mammal entanglement and death in trawl gear today, at reduced levels.

The 1996 National Research Council Bering Sea Ecosystem report concluded on the basis of the temporal and geographic pattern of fishing that fishery effects on sea lion prey availability are the only causal factor considered to have a high likelihood of involvement in sea lion declines in western Alaska since 1980.[336] The findings of the 1996 Bering Sea Ecosystem report foreshadowed the ESA Section 7 Steller sea lion consultations of 1998-2000. Building on these earlier findings, the December 3, 1998 BiOp and October 1999 Pollock Revised Final RPA (RFRPA) concluded that competition from the pollock fisheries in critical habitat is reasonably likely to diminish the prey base and the value of critical habitat, posing a serious threat to Steller sea lion survival and recovery:

> "In the [3 Dec 1998] Opinion, NMFS concluded that it would be reasonable to expect this competition to appreciably diminish the value of critical habitat for both the survival and recovery of the Steller sea lion, and appreciably reduce their likelihood of survival and recovery in the wild."[337]

Large-scale trawl fisheries targeting sea lion prey species such as pollock have expanded enormously and flourished since the 1970s in areas that supported the vast majority of Steller sea lions historically. During the mid- to late-1990s, 50-70% of the giant Bering Sea/Aleutian Islands pollock fishery catch was taken from critical habitat and the fishery had become heavily concentrated in the first quarter of the year during January through March at precisely the time of year when Steller sea lions are likely highly vulnerable to nutritional stress. Similar temporal and spatial concentration in sea lion critical habitat has occurred in the Gulf of Alaska pollock fishery, where 50-90% of the annual catch has come from critical habitat since the 1980s.

Concentration of these large-scale trawl fisheries on sea lion foraging grounds may cause localized depletions of the prey base and pose a serious competitive threat even when overall fish abundance is believed to be high, as was apparently the case with pollock in the early 1980s throughout large areas of the Bering Sea, Aleutian Islands, and Gulf of Alaska. In the 1990s and to the present, with major pollock stocks depleted and/or closed to directed fishing, the fisheries have maintained the high catch levels of the earlier decades while targeting the catches increasingly in sea lion critical habitat, thereby increasing the likelihood that locally adverse effects on prey availability and habitat occur. Thus, the December 3, 1998 Biological Opinion and the November 2000 FMP BiOp both concluded that these fisheries pose a serious competitive threat to Steller sea lions, jeopardizing the survival and recovery of the species and adversely modifying the species' critical habitat, the most important feature of which is food supply:

> "After considering all of the commercial fisheries that occur in the action area, especially in areas designated as critical habitat for sea lions, and comparing those fisheries against the various fish species consumed by Steller sea lions, we would conclude that commercial fisheries would reduce the availability of Steller sea lion prey in designated critical habitat. Given the magnitude of these harvests and their spatial and temporal extent, these removals

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[335] NMFS November 2000 FMP BiOp, p. 175.
[336] National Research Council. The Bering Sea Ecosystem. National Academy Press, Washington, D.C., 1996, p. 145, Table 4.18.
[337] NMFS October 1999 Pollock RFRPA, p. 17.

> could reduce the availability of prey in critical habitat for Steller sea lions sufficient to reduce the habitat's value to the sea lion population."[338]

As noted by the National Research Council (1996), spreading out these large trawl fisheries in time and area may prove beneficial to Steller sea lions and other pollock predators.[339] The December 3, 1998 BiOp reached the same conclusion regarding the need for, as well as the limits of, temporal spatial/management of the pollock fisheries:

> "The approach of the BiOp is consistent with the conclusions of several investigators, including the National Research Council (1996), which concluded that 'it is more likely that marine mammals and birds have been affected by the distribution in space and time, especially in areas where they are known to feed.' They also cautioned that even distributing fishing effort over space and time may not be sufficiently effective to reverse or even halt current population declines."[340]

In other words, temporal/spatial fishery regulations may benefit sea lions but will not, by themselves, ensure that sea lions are not harmed. In addition to the localized and direct competitive effects of fisheries in prime sea lion foraging habitat, the November 2000 FMP BiOp found that single-species fisheries exploitation rates have longer-term indirect and cumulative effects on the availability of exploited stocks that are likely to reduce the overall carrying capacity of critical habitat for sea lions.[341]

The FMP BiOp was the first time that NMFS has considered the potential for the exploitation policy based on Maximum Sustainable Yield (MSY) in the fishery management plans to outcompete other consumers in the ecosystem and reduce overall availability of sea lion prey at the "global" temporal-spatial scale of the fish stock as a whole, by design. In the FMP BiOp, NMFS concluded that the $F_{40\%}$ harvest policy is "reasonably likely to reduce significantly" the availability of prey to Steller sea lions and to reduce carrying capacity to a significant extent cumulatively.[342] The findings of jeopardy and adverse modification resulting from the cumulative depletion effect of the FMP $F_{40\%}$ harvest policy require NMFS to address the pollock harvest rate and the corresponding TAC levels under the status quo FMPs, as well as the temporal-spatial dispersion of the TAC relative to sea lion foraging habitat. Reducing the fishing rate ("harvest policy") and correspondingly reducing catch levels is the only way to provide a reasonable assurance of recovery of the Steller sea lion population toward historical levels. In short, to improve ecosystem carrying capacity for sea lions, the National Marine Fisheries Service must leave more prey in the water.

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[338] NMFS November 2000 FMP BiOp, p. 189.

[339] National Research Council Committee on the Bering Sea Ecosystem. The Bering Sea Ecosystem. National Academy Press, Washington D.C 1996, p. 6: "The concentrated fishing for pollock in some places at specific times probably reduces the availability of food for marine mammals and birds, especially juveniles. Thus one step that might help improve the food supply for and reverse declines in marine mammals and birds would be to distribute fishing over wider areas and over longer periods. This management strategy is unlikely to have any adverse effects."

[340] NMFS December 1998 BiOp, p. 102

[341] NMFS November 2000 FMP BiOp, pp. 225, 259.

[342] NMFS November 2000 FMP BiOp, p. 225: "…the differences between observed biomasses expected in the absence of fishing indicate that fishing has considerably reduced the potential spawning stock biomass of each species over the last 20 years. Figure 6.18 illustrates the reduction in eastern Bering Sea pollock biomass by cohort resulting from this exploitation strategy applied over the period from 1982 to 1998. This long-term reduction is reasonably likely to reduce significantly the availability of prey to other components of the ecosystem, such as Steller sea lions. In effect, fisheries remove fish from the population before they are 'lost' to natural mortality (e.g., other consumers of groundfish)."

2.1.1.1 Food competition: direct, indirect and cumulative impacts on Steller sea lions of the pollock fisheries

Past research on Steller sea lion body condition and reproductive rates indicates that food shortage is considered a likely explanation for the current pattern of chronic decline. As such, it appears that the ecosystem carrying capacity for Steller sea lions in western Alaska has collapsed. Although observed changes in sea lion condition and abundance are consistent with a reduction in carrying capacity that does not mean that the change is natural in origin.[343]

Pollock are a major forage fish of Steller sea lions throughout the year in the Bering Sea, Aleutian Islands and Gulf of Alaska. (Pitcher 1981; Frost and Lowry 1986; Calkins and Goodwin 1988; NMFS 1995; Merrick and Calkins 1996; NMFS 1998, 2000). In thirteen studies summarized by NMFS (1995), walleye pollock ranked first in importance as a prey item in eleven studies, and second in the remaining two. Importantly, Steller sea lions are the most direct competitor with the pollock fisheries, consuming large numbers of pollock of the same age/size targeted by the fishery.[344]

Commercially targeted fish stocks are not evenly distributed in space and neither is the fishing effort of the technologically advanced trawl fleets in the Bering Sea, Aleutian Islands and Gulf of Alaska, whose fish-catching capacity greatly exceeds the annual allowable catch. In the absence of effective time-area management and controls on catch rates, locally intense “pulse fishing” can cause localized depletions of fish and much of that effort has been concentrated in sea lion critical habitat since 1980. The November 2000 FMP BiOp cited information from fishermen during public testimony to the North Pacific Council in support of the conclusion that the fishing fleet depletes the biomass of targeted species in fished areas, by design.[345] The effects of these large-scale pulse fisheries on the sea lion prey field can be inferred from the pulse pattern of fishing, as described for pollock in the October 1999 Revised Final Pollock RPA:

> "Vessels fish an area until the density or availability [of pollock] is such that it is no longer profitable to continue fishing on the same school or aggregation, then search for another pollock aggregation of suitable size or density."[346]

The pollock RFRPA further noted that recovery of these fished areas may take days, weeks, months or longer.[347] In a workshop conducted by the Center for Marine Conservation in 1997, pollock fisherman and NPFMC member Dave Fraser described a pattern of pulse fishing and sequential depletion in the Aleutian Islands pollock fishery during the 1990s that can have more lasting effects on prey availability in a given area:

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343 NMFS Biological Opinion on 2000 TAC Specifications for the BSAI and GOA and American Fisheries Act, December 22, 1999, p. 66. ADF&G. Overview of State-Managed Marine Fisheries in the Central and Western Gulf of Alaska, Aleutian Islands and Southeastern Bering Sea with Reference to Steller Sea Lions. Regional Information Report 5J00-10. October 12, 2000, p. 19.

344 Lowry, Lloyd F., Kathryn J. Frost, and Thomas R. Loughlin. 1988. Importance of Walleye Pollock in the Diets of Marine Mammals in the Gulf of Alaska and Bering Sea, and Implications for Fishery Management. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, November 1988. Alaska Sea Grant Report 89-1. June 1989.

345 NMFS November 2000 FMP BiOp, p. 229.

346 NMFS 1999 Revised Final Reasonable and Prudent Alternatives for the Pollock Fisheries of the BS/AI and GOA with Supporting Documentation, p. 32.

347 NMFS 1999 Revised Final Reasonable and Prudent Alternatives for the Pollock Fisheries of the BS/AI and GOA with Supporting Documentation, p. 32.

> "A few years ago the entire Aleutian pollock TAC was taken basically out at [Islands of the] Four Mountain, the 170 line, because it was as close to town [Dutch Harbor] as possible and logistics are easy. A couple of years later, people just steamed right on by Four Mountain because there wasn't much there. Then the effort was at Seguam Pass, and then a couple of years later it was at North Head on the other side of Atka, and then the last couple of years it's been out at Tanaga. Although the TAC for the Aleutians might be entirely appropriate if effort were evenly distributed over the Aleutians, it's real evident that we're fishing one little spot at a time and knocking it down. It's a completely wrong way to go about it."[348]

In the October 1999 Pollock RFPRA, NMFS concluded that the pollock fisheries can be expected to alter the sea lion prey base over both short and long time scales:

> "Fisheries alter these prey fields. They may have long-term consequences (over multiple years) such as changes in the local composition of biological communities. They also have immediate or short-term (within-year) consequences related simply to removal of prey."[349]

The November 2000 FMP BiOp found that the $F_{40\%}$ harvest policy has reduced important sea lion prey stocks to 40-60% of the expected average unfished stock size over time, by design. Comparing the differences in the estimated fished and unfished spawning biomass for three major groundfish prey of sea lions in the BS/AI, NMFS finds that the fisheries for these three species have greatly reduced the amount of adult fish biomass that would be expected in the absence of fishing on average: "For the BSAI in 1999, the combined female spawning biomass for pollock, cod and Atka mackerel was 45% of the expected unfished level."[350] Thus, the cumulative effect of fishing at the global temporal/spatial scale is additive to the competitive pressures of fishing at the regional and local temporal/spatial scales:

> "The reductions of biomass at larger spatial scales would exacerbate the effects of small-scale depletions caused by fishing; because the spawning biomass in the entire ecosystem is about half of what it would be without fishing, there are fewer spawning-aged fish to replenish areas where fishing has occurred."[351]

The *cumulative* ecosystem-level ("global") effect of fishing down stocks under the MSY-based fishing exploitation rates is such that the value of critical habitat (the most important feature of which is prey) is effectively diminished even before fishing starts at the beginning of every year.

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[348] Center for Marine Conservation. Alaska Seas Marine Conservation Biology Workshop Report, Anchorage, Alaska, October 6 and 7, 1997.
[349] NMFS 1999 Revised Final Reasonable and Prudent Alternatives for the Pollock Fisheries of the BS/AI and GOA with Supporting Documentation, pp. 31-32.
[350] NMFS November 2000 FMP BiOp, p. 224.
[351] NMFS November 2000 FMP BiOp, p. 264.

THE $F_{40\%}$ HARVEST STRATEGY IS NOT ONLY CALCULATED TO REDUCE OVERALL PREY AVAILABILITY SIGNIFICANTLY, BUT IS ALSO LIKELY TO REDUCE THE AVERAGE AGE AND WEIGHT OF EXPLOITED FISH STOCKS SIGNIFICANTLY OVER TIME. FOR INSTANCE, THE FMP BIOP'S ANALYSIS OF FISHED AND UNFISHED POPULATIONS (USING A CONVENTIONAL SINGLE-SPECIES MODEL AND MSY EQUILIBRIUM ASSUMPTIONS) INDICATES THE "AVERAGE" EASTERN BERING POLLOCK IS MORE THAN A YEAR YOUNGER AND 30% LESS IN MEAN WEIGHT UNDER AN $F_{40\%}$ EXPLOITATION STRATEGY. THESE EFFECTS HAVE BEEN THE SOURCE OF CONSIDERABLE CONCERN TO MARINE MAMMAL BIOLOGISTS STUDYING THE DECLINE OF THE STELLER SEA LION IN WESTERN ALASKA BECAUSE THE DIFFERENCE IN AVERAGE AGE/WEIGHT BETWEEN FISHED AND UNFISHED POPULATIONS WOULD REQUIRE SEA LIONS TO EXPEND MORE ENERGY FORAGING FOR THE SAME ENERGY INPUT,[352] AND COULD HAVE SERIOUS IMPLICATIONS FOR BOTH JUVENILE AND ADULT ANIMALS:

- "Marine mammals may be greatly influenced by the size and age class composition of fish stocks. Some marine mammals including ribbon seals, spotted and fur seals feed primarily on juvenile fishes, in contrast to sea lions that eat larger fish. During the past decade when extensive fishing resulted in a decrease in the abundance of large pollock, sea lions may have been affected more than species feeding on smaller size classes."[353]

- Calkins and Goodwin noted that pollock eaten by sea lions in the GOA in the 1970s were bigger on average than in the 1980s. The average weight of pollock eaten in the 1970s was estimated at 148g compared to 93g in1985-86, implying the need to eat more fish to get the same number of calories in the later period. Long-term effects of fishery-induced changes in age structure of the stock, average size and weight of individual fish, and fecundity of pollock may have been a factor in the GOA sea lion decline in the 1980s.[354]

- ***Similar conditions may have occurred in the Bering Sea in the mid-1970s. Lowry et al. (1988) found that the decline of exploitable-age pollock (ages 2-9) in the Bering Sea in the mid- to late-1970s was the result of "the cumulative removals by the fishery in 1970-75 (which totaled 9.6 million tons) (Bakkala et al. 1987), at which time the average length of pollock caught dropped from 42-44 cm to 35 cm (Pereyra et al., 1976), thus the projected weight of fishes would have declined by about 45% and could have had a deleterious impact of sea lion nutrition."[355]***

- ***A summary of food habits data in the Gulf of Alaska by Merrick and Calkins concluded that slightly over half of the pollock mass consumed by juvenile sea lions came from juvenile pollock (<30 cm length) with the rest coming from larger fish, whereas 79% of the pollock mass consumed by adult sea lions came from larger fish. Thus even if smaller pollock may be more readily available in the fished population and represent a larger percentage of occurrence in the sea lion diet, the few large fish eaten by an individual sea lion (including juvenile sea***

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[352] NMFS November 2000 FMP BiOp, p. 226.

[353] Frost, Kathryn J. and Lloyd F. Lowry. 1986. Sizes of walleye pollock, *Theragra chalcogramma*, consumed by marine mammals in the Bering Sea. Fishery Bulletin: Vol. 84, No. 1.

[354] Calkins, D. and E. Goodwin. 1988. Investigation of the decline of Steller sea lions in the Gulf of Alaska. Final Report to NMFS, NMML Contract No. NA-85-ABH-00029. 76 pp.

[355] Lowry, Lloyd F., Kathryn J. Frost, and Thomas R. Loughlin. 1988. Importance of Walleye Pollock in the Diets of Marine Mammals in the Gulf of Alaska and Bering Sea, and Implications for Fishery Management. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, November 1988. Alaska Sea Grant Report 89-1. June 1989.

lions) may make a significantly larger contribution to food energy intake per unit of foraging effort.[356]

- ***An August 1999 Steller sea lion recovery team workshop report on foraging ecology included a summary report by Alan Springer on stomach contents taken from subsistence-caught sea lions in the Pribilof Islands from 1994-1998. Frequency of occurrence of prey in scat data does not tell much about the relative biomass contribution of the fish species eaten by sea lions, but stomach sampling does. Stomach sampling in the Pribilof animals indicated that Steller sea lions of all ages "***obtain the most prey biomass from pollock in the 40-55 cm size class. Younger sea lions do take greater numbers of pollock from smaller size classes, but these constitute a small proportion of the overall biomass consumed."[357]

2.1.1.2 The RPA/Emergency Rule "Global Control Rule" fails to avoid jeopardy and adverse modification at the global scale of competitive interaction resulting from the cumulative effects of the $F_{40\%}$ exploitation strategy

The RPA/Emergency Rule "Global (Harvest) Control Rule" does nothing to prevent stocks from falling below the $B_{40\%}$ "target" stock size. Thus, the control rule fails to address the jeopardy and adverse modification of the $F_{40\%}$ harvest policy because it does not stop fishing until after the estimated stock biomass has dropped 50% below that target biomass, i.e., to $B_{20\%}$. Questions that must be asked of the Global Control Rule include:

- If $B_{40\%}$ constitutes a "take" threshold, why wait until after a stock has dropped below the $B_{40\%}$ "target" biomass before reducing the *F* rate and ABCs?

- How does the Global Control Rule purport to address the cumulative impact of a 60% average reduction in important sea lion prey stocks resulting from application of the $F_{40\%}$ fishing strategy, since it only goes into effect when the stock size estimate has dropped to ½ of $B_{40\%}$?

The FMP BiOp does not say that temporal-spatial mitigations at the regional and local level are sufficient to avoid jeopardy by themselves, rather it states that the Global Control Rule is the mechanism for avoiding jeopardy and adverse modification at this ecosystem scale:

"The global control rule operates at the ecosystem or global scale, and as such, it is neither a partitioning or dispersive action. It is a revised, more precautionary adjustment procedure for pollock, Pacific cod or Atka mackerel stocks in the EBS, AI and GOA at small stock sizes (below B40%) than currently exists under the FMP. The effect of using the global control rule

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[356] Merrick, Richard L. and Donald G. Calkins. 1996. Importance of Juvenile Walleye Pollock, *Theragra chalcogramma*, in the Diet of Gulf of Alaska Steller Sea Lions, Eumetopias jubatus. In: U.S. Dep. Commer. NOAA Tech. Rep. NMFS 126, pp. 153-166.

[357] Steller Sea Lion Recovery Team. 1999. Report of the Feeding Ecology Workshop, Seattle, WA., February 11-12, 1999. Al Didier, rapporteur. 42 pp.

> is increased likelihood that the stock is maintained at or above the target stock size by reducing the exploitation rate at low stock sizes…"[358]

It is unclear, however, how "reducing the exploitation rate at low stock sizes"(i.e., ½ $B_{40\%}$) is supposed to increase the likelihood "that the stock is maintained at or above the target stock size." If the $F_{40\%}$ fishing strategy is responsible to a significant degree for reducing prey availability and hence the carrying capacity of critical habitat for Steller sea lions, maintaining the $F_{40\%}$ fishing rate and allowing the stock to drop to one-half of the $B_{40\%}$ target stock size under the Global Control Rule simply fails to address jeopardy and adverse modification at the global scale of competitive interaction.

In effect, the substitution of the Global Control Rule for lower *F* rates and lower TAC levels reflects that NMFS intends to leave only enough prey in the water to support a vastly diminished sea lion population. The Administrative Record for the FMP BiOp indicates that the Global Control Rule was premised on levels of stock biomass sufficient only to support the current population:

> "…the THIRD control rule prohibits harvest inside critical habitat when prey stock biomass is insufficient to support the current sea lion population…"[359]

Even at its earliest inception, the Global Control Rule was premised on using the current sea lion population as a baseline for determining how much prey to leave in the ecosystem and when to reduce fishing effort, even though this population has suffered an 80-90% decline in significant part due to the cumulative effects of the $F_{40\%}$ fishing strategy, which had reduced the combined female spawning biomass for pollock, cod, and Atka mackerel to 45% of the expected unfished level by 1999.[360]

The Harvest Control Rule fails to address key features of the jeopardy and adverse modification that NMFS has found reasonably likely to occur at the global scale of competitive interaction resulting from the FMP harvest policy, including:

- The November 2000 FMP BiOp finds that the goal of the MSY-based harvest policy is to remove fish before they are "lost" to natural mortality by other ecosystem consumers.[361] Single-species fishery exploitation rates are designed to out-compete the other parts of the ecosystem that contribute to natural mortality (M) for a particular species.[362]

- An MSY or MSY-proxy ($F_{40\%}$) fishing strategy assumes that any recruitment of juvenile fish to the adult spawning stock above the theoretical replacement line necessary to maintain the adult population at a given stock size is a "surplus" for the fishery. However, strictly speaking, there is no surplus production in marine ecosystems.[363]

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[358] NMFS November 2000 FMP BiOp, p. 291.
[359] Administrative Record #199, 11-03-01, RE: Development of the "Thompson-Hollowed-Ianelli-Rosenberg-Dorn ("THIRD") control rule.
[360] NMFS November 2000 FMP BiOp, p. 224.
[361] NMFS November 2000 FMP BiOp, p. 225.
[362] NMFS 2001 Draft PSEIS, Sec. 4.2, p. 5.
[363] NMFS November 2000 FMP BiOp, pp. 208, 223-224.

- Fishing under the $F_{40\%}$ harvest policy has considerably reduced the potential spawning stock biomass of fully targeted species over the last twenty years, in addition to reducing the average age and weight of exploited stocks.[364]

- This long-term reduction on the order of 40-60% is reasonably likely to reduce significantly the availability of prey to other components of the ecosystem, such as Steller sea lions.[365]

- This stock-wide reduction in biomass effectively diminishes the carrying capacity of critical habitat for the Steller sea lions.[366]

- NMFS concludes that biomass reductions of important groundfish species below 40% of their unfished level would "not insure" the protection of listed species or their environment[367] and indicates that stocks sizes for pollock, cod and Atka mackerel below the $B_{40\%}$ target biomass constitute a "take" of Steller sea lions.[368]

The findings of the FMP BiOp require NMFS to address the contradictions between conventional yield-based management goals and goals for protection of the ecosystem. Nowhere, however, does NMFS explicitly ask or examine the question of why the default FMP "harvest policy" should be set at $F_{40\%}$ rather than $F_{50\%}$, $F_{75\%}$, $F_{90\%}$, or some other rate that is more consistent with goals for ecosystem-based management.

2.1.1.3 The pollock fisheries continue to operate in violation of the ESA

Successive Emergency Interim RPA rules have not established a fishing regime that effectively reduces and disperses pollock catches inside and outside sea lion critical habitat in order to avoid the conditions that precipitated the initial finding of jeopardy and adverse modification in 1998, nor have the rules adequately addressed the cumulative effects of fishing at the global temporal/spatial scale of competitive interaction.

On July 19, 2000, the federal district court enjoined all groundfish trawl fishing off Alaska within Steller sea lion critical habitat west of 144W longitude, pending preparation of a Programmatic FMP-level Biological Opinion by NMFS. With the release of that Section 7 consultation on November 30, 2000 (the FMP BiOp), NMFS concluded that the groundfish fisheries as a whole jeopardize Steller sea lions and adversely modify sea lion critical habitat, requiring new and more comprehensive RPA regulations for pollock, Atka mackerel and Pacific cod fisheries, including rules to address the cumulative effects of fishing at the global scale of competitive interaction. Those reasonable and prudent alternative (RPA) measures were not enacted and the fisheries have operated under emergency RPA rules based on 1999-2000 revised pollock RPA regulations during 2001-2002. These

[364] NMFS November 2000 FMP BiOp, pp. 223-225.
[365] NMFS November 2000 FMP BiOp, p. 225.

[366] NMFS November 2000 FMP BiOp, p. 259.
[367] NMFS November 2000 FMP BiOp, pp. 250-51
[368] NMFS November 2000 FMP BiOp, p. 259.

rules fall far short of what is required in the FMP BiOp and are not adequate to insure that jeopardy and adverse modification are avoided. Currently the fisheries are operating under Emergency Interim Rules through June 2002, pending judicial review of the 2001 "RPA" Biological Opinion.[369]

2.1.2 Impacts of the pollock fisheries on Northern fur seals

Approximately 75% of the world population of northern fur seals migrates into the eastern Bering Sea to breed and raise pups at the Pribilof Islands every summer. The decline of the Pribilof Island fur seal population in the late 1970s and early 1980s and the lack of population growth through the 1990s may be related to diet or food availability.[370] The 1981 Final BS/AI EIS observed that the end of hunting for female fur seals in 1968 did not produce the expected increase in the number of pups, leading to the conclusion that competition with commercial groundfish operations for groundfish resources "is a likely reason for the failure of the northern fur seal population to increase, although there is no decisive evidence to this effect Most recent estimates of northern fur seal population in the North Pacific are less than 1 million, down 20% from the 1.25 million estimated in 1974 and as much as 50-60% below the level of the 1950s.[371]

Pollock availability is of particular concern, since it has consistently comprised a large percentage of the fur seal diet during the breeding and pup-rearing season from June to October on the Pribilofs Islands:

- Since the late 1800s, pollock has been a known primary prey for fur seals, revealed when fur seal stomachs were examined during the pelagic fur seal harvest.[372]

- From 1958-74, f food samples from fur seals collected at sea revealed that the principal prey items consisted of squids, pollock, and capelin as well as lesser amounts of Atka mackerel, herring and deep water smelts.[373]

[369] For detailed discussion of the shortcomings of the RPA measures, *see* Plaintiff's Motion and Memorandum in Support of Motion for Summary Judgment in *Greenpeace et al., v. NMFS*, April 24, 2002.

[370] Sinclair, Elizabeth H., George A. Antonellis, Bruce W. Robson, Rolf R. Ream, and Thomas R. Loughlin. 1996. Northern fur seal, Callorhinus ursinus, Predation on Juvenile Walleye Pollock, Theragra chalcogramma. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop "The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems," Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).

[371] NPFMC/NMFS 1998.

[372] Jordan, David Starr, Leonard Stejneger, Frederic Augustus Lucas, and George Archibald. Second Preliminary Report of the Bering Sea Fur Seal Investigations, Washington, D.C., Govt. Printing Office. 1898; Alexander, A. B. 1898.Observations During A Cruise on the Dora Siewerd, August-September, 1895. In: Seal and Salmon Fisheries and General Resources of Alaska, Vol. IV; Jordan, D.S., and B.W. Evermann. American Food and Game Fisheries, A Popular Account of All the Species Found in America North of the Equator. Doubleday, Page and Co., 572 pp. 1902 Springer, A.M. 1992. A Review: Walleye Pollock in the North Pacific -- How Much Difference Do They Really Make? Fisheries Oceanography, Vol. 1:1.

[373] Fiscus, Clifford H., Gary A. Baines, and Ford Wilke. 1962. Pelagic Fur Seal Investigations, Alaska Waters. U.S. DOI/FWS, Special Scientific Report -- Fisheries No. 475; Sinclair, Elizabeth, Thomas Loughlin, and William Pearcy. 1994. Prey Selection by northern fur seals (Callorhinus ursinus) in the eastern Bering Sea. Fishery Bulletin 92: 144-156.

- During October 1981-1982 and August 1985, food samples taken from 73 fur seal stomachs collected near the Pribilof Islands indicated that 82% of the samples contained walleye pollock.[374]

- From 1987-90, walleye pollock represented 78% of the total prey found in 847 fecal samples collected.[375]

- After reviewing past and recent food habits data, Sinclair et al. (1994) concluded that the diet of female and juvenile male northern fur seals in the eastern Bering Sea has probably not changed much since the turn of the century: "…fur seal consumption of walleye pollock, gonatid squid, and bathylagid smelt in the eastern Bering Sea is consistent throughout historical records, despite the wide variety of prey available to fur seals within their diving range."

In the 2001 Steller sea lion Protection Measures SEIS, NMFS provided fur seal satellite telemetry tracking data that shows substantial overlap of fur seal foraging home ranges and the Bering Sea pollock fishery.[376] Moreover, the total catch of pollock as well as the hours trawled in fur seal home ranges and percentage of hours trawled when fur seals occupy the eastern Bering Sea in greatest numbers from June through October have increased since the late-1990s, indicating that measures designed to reduce pollock trawling in the eastern Aleutians Steller sea lion critical habitat during 1999-2000 resulted in greater pollock fishing in fur seal foraging habitat. Thus displacement of pollock fishing from sea lion critical habitat may increase competitive interactions with fur seals unless measures are adopted to limit the impacts of pollock fishing more generally. In the Steller sea lion Protection Measures SEIS, NMFS rated the effects of the alternatives fishery as "conditionally significant negative" for spatial/temporal concentration due to the effects of increased pollock fishing in fur seal habitat.

Of particular concern is the decline of fur seal pup production since the development of the pollock fisheries in the Bering Sea. Fur seal pup count estimates on the Pribilof Islands of St. Paul and St. George combined have declined steadily from over half a million in 1950 to less than 180,000 in 2000, despite the end of commercial seal hunting in 1968.[377] The 2000 pup count was the lowest since 1921, when the population was badly depleted by the commercial hunt. As noted above, reproduction in otariid pinnipeds has been characterized as energetically expensive and particularly

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374 Sinclair, Elizabeth, Thomas Loughlin, and William Pearcy. 1994. Prey Selection by northern fur seals (Callorhinus ursinus) in the eastern Bering Sea. Fishery Bulletin 92: 144-156.

375 Sinclair, Elizabeth H., George A. Antonellis, Bruce W. Robson, Rolf R. Ream, and Thomas R. Loughlin. 1996. Northern fur seal, Callorhinus ursinus, Predation on Juvenile Walleye Pollock, Theragra chalcogramma. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop "The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems," Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).

376 NMFS Final SSL Protection Measures SEIS, November 2001, Figures 4.1-1, 4.1-2, 4.1-3, pp. 4-66-67.

377 Anne York, NMML, personal communication, 29 November 2000.

vulnerable to food shortages.[378] Thus the ongoing declines in fur seal pup production may indicate that fur seal females are not able to obtain adequate food supplies. While preliminary, such a conclusion is consistent with research on Antarctic fur seals, whose pregnancy status and birth rates in the summer months appeared strongly related to food resources in the previous fall and winter seasons,[379] and with the findings of research on fur seals and sea lions more generally.[380]

2.1.3 Impacts of the pollock fisheries on Pacific harbor seals and other seals

NMFS has characterized the Gulf of Alaska harbor seal stock as depleted and unable to reach or maintain its Optimum Sustainable Population (OSP), but it remains without protected status under the Marine Mammal Protection Act (MMPA) or ESA. Although the Bering Sea population is less well studied, there is evidence that the BS/AI population has also declined very significantly. Apparently large declines have occurred on the north side of the Alaska Peninsula, at Otter Island (Pribilofs), and along the Aleutian Islands since the mid-1970s. A study from the 1940s ranked pollock as top prey of harbor seals in Southeast Alaska,[381] and studies in the 1980s ranked pollock as number one prey item of harbor seals in the Gulf of Alaska.[382] Extensive data on harbor seal diets in the Bering Sea is not available at this time, but pollock is a known prey of importance.[383]

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[378] Kenneth W. Pitcher, Donald G. Calkins, and Grey W. Pendleton. "Reproductive performance of female Steller sea lions: an energetics-based reproductive strategy?" Can. J. Zool. 76: 2075-2083 (1998).

[379] Lunn, N.J., and I.L. Boyd. Influence of maternal characteristics and environmental variation on reproduction in Antarctic fur seals. Symp. Zool. Soc. Lond. (1993) No. 66: 115-129; Boyd, I.L. 1996. Individual variation in the duration of pregnancy and birth date in Antarctic fur seals: the role of environment, age and sex of fetus. J. Mammal. 77: 124-133; Boyd, I.L. Croxall, J.P., Lunn, N.J., and Reid, K. 1995. Population demography of Antarctic fur seals: the costs of reproduction and implications for life histories. J. Anim. Ecol. 64: 505-518.

[380] ***Costa, D.P. 1993. The relationship between reproductive and foraging energetics and the evolution of Pinnipedia. Symp. Zool. Soc. Lond. 66: 293-314; Costa, D.P., J.P. Croxall, and C.D. Duck. 1989. Reproductive energetics of Antarctic fur seals in relation to changes in prey availability. Ecology 70: 595-606; Trillmich and Ono 1991; Trillmich, F., and K. Ono (eds.). 1991. Pinnipeds and El Nino. Responses to environmental stress. Springer Verlag, Heidelberg. 293 pp.; Pitcher, Kenneth W., Donald G. Calkins, and Grey W. Pendleton. 1998. "Reproductive performance of female Steller sea lions: an energetics-based reproductive strategy?" Can. J. Zool. 76: 2075-2083; National Marine Fisheries Service. 1998b. Endangered Species Act Section 7 Biological Opinion on the Atka Mackerel Fishery of the BS/AI and Pollock Fisheries of the BS/AI and GOA. December 3; National Marine Fisheries Service. 2000. ESA Section 7 Steller Sea Lion Biological Opinion on the Fishery Management Plans (FMPs) of the Bering Sea/Aleutian Islands and Gulf of Alaska, November 30, 2000.***

[381] Imler, R. H., and H. R. Sarber. 1947. Harbor seals and sea lions in Alaska. U.S. Fish Wildl. Serv., Spec, Sci. Rep. 28, 23 p.

[382] Pitcher, Kenneth W. 1980. Food of the Harbor Seal, *Phoca vitulina richardsi*, in the Gulf of Alaska. Fishery Bulletin: Vol. 78, No. 2: pp. 544-549.

[383] L. F. Lowry, V. N. Burkanov, K. J. Frost. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, and Anne B. Hollowed (eds.), Ecology of Juvenile Walleye Pollock, Theragra chalcogramma. NOAA Technical Report NMFS 126, December 1996: 141-151.

While most phocid seals eat mostly smaller pollock, harbor seals are the principal exception, eating all sizes of pollock.[384] As is the case with Steller sea lions, the data suggests that larger pollock may be important to harbor seal nutrition even though they represent fewer numbers of pollock eaten:

> "Because of the exponential relation between pollock length and weight, however, the few larger fishes that are eaten may be of considerable nutritional significance. We used the formula in Frost and Lowry (1981b) to estimate the weights of pollock eaten by harbor seals in the central Bering Sea in April 1979. Although only 11 of the 23 pollock eaten were estimated to be over 30 cm long, those fishes contributed 84% of the estimated biomass consumed."[385]

Recognizing the potential for significant competitive pressure from fisheries, NMFS rated the effects of the status quo and preferred alternatives in the Steller sea lion Protection Measures SEIS as "conditionally significant negative" for spatial/temporal concentration due to the effects of fishing in harbor seal habitat:

> "Harbor seals would benefit from management measures that displace pollock, cod and Atka mackerel fisheries farther offshore (i.e., greater than 20 nm) throughout much of the GOA and BSAI areas. Harbor seals are distributed almost continuously from Cape Suckling to the end of the Aleutian chain. . . . Competitive interaction from fisheries that harvest pollock, cod and Atka mackerel in these areas could place significant additional burden on these populations."[386]

Lowry et al. summarized principal foods of seals in the Bering Sea and Sea of Okhotsk.[387] Harbor, spotted, ribbon and ringed seals all eat significant amounts of pollock, along with saffron cod, arctic cod and/or Pacific cod, depending on the locale. In the eastern Bering Sea, spotted and ringed seals are believed to eat large amounts of pollock along the ice edge in winter.[388] NMFS also noted that spotted seals and ribbon seals occupy the front zone of the pack ice extending into the southern Bering Sea during the winter and spring, and feed on pollock. Since they tend to eat smaller, younger pollock than those taken by the fishery, NMFS concludes that there is little direct competition.[389] What NMFS does not consider, however, are the indirect and cumulative effects of the harvest policy (i.e., fishing down the spawning stock over time) so that fewer pollock are available on average in the system.

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[384] L. F. Lowry, V. N. Burkanov, K. J. Frost. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, and Anne B. Hollowed (eds.), Ecology of Juvenile Walleye Pollock, Theragra chalcogramma. NOAA Technical Report NMFS 126, December 1996: 141-151.
[385] L. F. Lowry, V. N. Burkanov, K. J. Frost. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, and Anne B. Hollowed (eds.), Ecology of Juvenile Walleye Pollock, Theragra chalcogramma. NOAA Technical Report NMFS 126, December 1996: 141-151.
[386] NMFS Final SSL Protection Measures SEIS, November 2001, p. 4-74.
[387] L. F. Lowry, V. N. Burkanov, K. J. Frost. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, and Anne B. Hollowed (eds.), Ecology of Juvenile Walleye Pollock, Theragra chalcogramma. NOAA Technical Report NMFS 126, December 1996: Table 3, p. 149.
[388] L. F. Lowry, V. N. Burkanov, K. J. Frost. Importance of walleye pollock, Theragra chalcogramma, in the diet of phocid seals in the Bering Sea and northwestern Pacific Ocean. In: Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, and Anne B. Hollowed (eds.), Ecology of Juvenile Walleye Pollock, Theragra chalcogramma. NOAA Technical Report NMFS 126, December 1996: 141-151.
[389] NMFS Final SSL Protection Measures SEIS, November 2001, p. 4-75.

2.1.4 Impacts of the pollock fisheries on cetaceans

Seventeen cetacean species in eight families are commonly found in the North Pacific on a seasonal or year-round basis:

Baleen whales:

Blue whale (*Balaenoptera musculus*)
Fin whale (*Balaenoptera physalus*)
Sei whale (*Balaenoptera borealis*)
Humpback whale (*Megaptera novaeangliae*)
Minke whale (*Balaenoptera acutorostrata)*
Dall's porpoise (*Phocoenoides dalli*)
Gray whale (*Eschrichtius robustus*)

Bowhead whale (*Balaena mysticetus*)
Northern right whale (*Eubalaena glacialis*)

Toothed whales:

Sperm whale (*Physeter macrocephalus*)
Baird's whale (*Berardius bairdi*)
Cuvier's whale (*Ziphius cavirostris*)
Stejneger's beaked whale (*Mesoplodon stejnegeri*)

Pacific white-sided dolphin (*Langenorhynchus obliquidens*)
Northern right whale dolphin (*Langenorhynchus borealis*)
Beluga whale (*Delphinapterus leucas*)
Harbor porpoise (*Phocoena phocoena*)

Whaling had a devastating impact on populations of most large whale species in the nineteenth and twentieth centuries. Commercial whaling in the North Pacific started in the mid-nineteenth century when American whalers decimated large stocks of bowhead and right whales, in addition to gray whales on their wintering grounds off Baja. Somewhat smaller-scale, shorebased Norwegian-American whaling companies operated in the eastern Aleutian Islands and Gulf of Alaska during the early twentieth century. In the 1950s modern pelagic whaling with factory ships was introduced on a large-scale, beginning in the Kuril Islands and eastern Kamchatka region, expanding into the eastern Bering Sea and Gulf of Alaska from the 1950s to 1970s. This latter period was particularly disastrous for populations of blue, fin, sei, humpback and sperm whales throughout the Bering Sea, Aleutian Islands and Gulf of Alaska. (NRC 1996).[390]

Today all major stocks of large baleen whales and sperm whales are considered severely depleted and all are listed as endangered under the ESA, including the North Pacific right whale, blue whale, fin whale, sei whale, humpback whale, sperm whale, and bowhead whale.[391] Stock structure and population estimates are unknown or highly uncertain for most species. Only the eastern North Pacific gray whale stock is considered fully recovered, nearly 150 years after American whalers nearly wiped out the stock on wintering grounds off Baja.

2.1.4.1 Direct effects of the pollock fishery on cetaceans

Direct mortalities of endangered whales in fishing gear are occasionally reported in the groundfish fisheries, including the pollock fisheries of the BS/AI and GOA. Since 1989 at least three of the ESA-listed whale species have been killed by entanglement in fishing gear, including a fin while in

[390] National Research Council. The Bering Sea Ecosystem. National Academy Press, 1996, p. 220.
[391] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-35.

the GOA pollock fishery south of Kodiak Island in 1999 and two humpback whales in the Bering Sea pollock fishery near Unimak Pass in 1998 and 1999.[392] In some cases dead whales have been found entangled in fishing gear but it is not know if the gear was in use at the time of entanglement or if whales were entangled by derelict gear.[393]

In addition to entanglement in fishing gear, disturbance caused by vessel traffic, fishing operations or underwater noise associated with fishing activity may have significant effects on the foraging behavior and distribution of whales within fished areas, including changes in whale vocalizations, short-term displacement and long-term abandonment of high-use areas.[394] These effects are "largely unknown" in the BS/AI and GOA, according to NMFS.[395] In the absence of good information, significant disturbance effects should be expected in heavily trawled areas.

2.1.4.2 Cetacean consumption of pollock: the potential for competition with some species exists

At least ten cetacean species are known or believed to feed on walleye pollock to some significant extent, based on limited information:

beluga whale, *Delphinapterus leucas*
Dall's porpoise, *Phocoenoides dalli*
harbor porpoise, *Phocoena phocoena*
Pacific white-sided dolphin, *Lagenorhynchus obliquidens*
killer whale, *Orcinus orca*
fin whale, *Balaenoptera physalus*
sei whale, *Balaenoptera borealis*
minke whale, *Balaenoptera acutorostrata*
humpback whale, *Megaptera novaeangliae*

Species such as Atka mackerel and pollock have been identified as major prey items of humpback whales in the Aleutian Islands.[396] Consumption of pollock by fin whales appears to increase in years in which euphausiids and copepod abundance is low.[397] Pelagic schooling fishes such as pollock, mackerel, capelin, herring, sand lance, etc., comprise over 90% of the total prey weight ingested by minke whales, based on studies from the North Pacific.[398]

Table 14 summarized the relative importance of gadid fishes in marine mammal diet studies from the Bering Sea, based on limited information from the 1980s. The information for cetaceans is repeated here with the caveat that studies of cetacean food habits in the North Pacific are extremely limited, generally represent opportunistic sampling of few animals, and do capture differences in regional feeding habits:

[392] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-36.
[393] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-36: "It is often difficult to determine if the entanglement occurred with active or derelict gear, or to identify the fishery the derelict gear originated from."
[394] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-37.
[395] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-37.
[396] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-36.
[397] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-36.
[398] NMFS November 2001 Final SEIS for Steller sea lion Protection Measures, p. 4-47.

Table 14 -- Relative Importance of Gadid Fishes in the Bering Sea

	Arctic Cod	Saffron Cod	Pacific Cod	Pacific Tomcod	Walleye Pollock
Cetaceans:					
Minke whale	1	1	5	4	3
Sei whale	3	4	4	4	3
Fin whale	2	2	2	4	2
Humpback whale	3	3	3	5	3
Killer whale	5	5	5	5	5
Harbor porpoise	5	1	5	5	5
Dall's porpoise	4	4	4	4	3
Beluga	1	1	4	4	1
Sperm whale	4	4	4	4	3
Giant bottlenose whale	4	3	4	4	3

1=major prey item; 2= minor, but common; 3=minor, but uncommon;
4=not known as prey; 5=insufficient data.

Source: Michael A. Perez and Thomas R. Loughlin. Relationships Among Marine Mammals and Gadoid Fishes: A Comparison Between the Bering Sea and the North Sea. In: Proceedings of the Workshop on Comparative Biology, Assessment, and Management of Gadoids from the North Pacific and Atlantic Oceans, compiled by M. Alton. Seattle, WA, 24-28 June, 1985, (1986), pp. 357-392.

Clearly there is a potential for indirect, direct and cumulative competition with the pollock fisheries, though such competitive interactions have not been studied and generally have been ignored.

2.2 Impacts of the pollock fishery on seabirds

The eastern Bering Sea supports some of the largest concentrations of seabirds in the world. The Pribilof Islands support the greatest numbers of thick-billed murres in the Pacific Ocean, as well as 90% of the world's breeding population of red-legged kittiwakes, a species endemic to the Bering Sea.[399] Large declines of piscivorous murres and kittiwakes in the Pribilof Islands over the past 20 years[400] have raised concerns that their decline signals some bigger problem in the ecosystem:

> "the vast majority of the world's population of red-legged kittiwakes and the largest thick-billed murre colony in Alaska are at risk, which may indicate a problem with the health of the marine ecosystem of the southern Bering Sea."[401]

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399 Springer, A.M. 1993. Report of the seabird working group. *In*: Alaska Sea Grant Report 93-01.
Springer, A.M. and G.V. Byrd. 1989. Seabird dependence on walleye pollock in the southeastern Bering Sea. Proc. Int. Symp. Biol. Mgmt. Walleye Pollock. Nov. 1988. Anchorage, AK.:667-677.

400 Piatt and Anderson (1996) cite evidence of similar large declines in cormorants, kittiwakes, murres, puffins, and marbled murrelets in some areas of the Gulf of Alaska from the mid-1970s to mid-1980s.

401 Dragoo, B.K., and K. Sundseth. 1993. The status of northern fulmars, kittiwakes, and murres at St. George Island, Alaska, in 1992. USFWS Report AMNRW 93/10.

Major families of seabirds in the North Pacific action area with potential for direct or indirect interaction with the pollock fishery include: Diomedeidae (albatrosses), Alcidae (murres, puffins, auklets, murrelets and guillemots), Laridae (gulls, terns, jaegers), Procellariidae (fulmars, shearwaters), Hydrobatidae (storm-petrels), and Phalacrocoracidae (cormorants). Seabirds are killed incidentally in all types of fishing operations, but most (about 88%) of the direct seabird mortality in the North Pacific groundfish fisheries has been documented in the hook-and-line fisheries as a result of birds targeting baited hooks, while most of the rest occurs in the trawl fisheries.[402] Based on observer estimates from 1993-1999, 86% of the longline seabird bycatch occurred in the Bering Sea and Aleutian Islands region, 14% in the Gulf of Alaska.[403] Additional unquantified mortality occurs from ship strikes when birds collide with vessels. In 1999, the U.S. Fish and Wildlife Service has issued an ESA Section 7 consultation biological opinion on groundfish fisheries and endangered short-tailed albatross, requiring NMFS to implement an incidental take limit by the longline fisheries of four short-tailed albatross per two-year period.

2.2.1 Direct and local effects of pollock trawling in the vicinity of seabird colonies

Seabirds are generally considered at less risk from food competition because they target juvenile fish and therefore do not have the same potential for direct competition with the fisheries as some seals or Steller sea lions. However, seabirds consume large quantities of the fish prey around breeding and nesting colonies. NMFS has cited Ashmole (1963) regarding the "halo" effect of depletion of prey around seabird colonies, and Furness (1984) regarding the findings that seabirds can consume almost a third of the pelagic fish production within 45 km of nesting colonies.[404] NMFS concludes that similar effects of fishing should be expected from the large commercial fishing fleets off Alaska:

> "If seabirds can sufficiently deplete prey resources around their colonies to compete with other members of those colonies it is reasonable to expect commercial fleets, with the kind of fishing power in which an individual net's catch area encompasses 1.5 acres (Springer 1992), would remove more of their target species and any bycatch from the water column and also deplete prey in their fishing grounds."[405]

Indeed, large amounts of juvenile pollock may be taken as unwanted bycatch in trawl gear. Given the size of the pollock fisheries and the quantities of pollock bycatch recorded during the 1990s, it is reasonable to expect that bycatch or disruption of dense schools of juvenile pollock from repeated tows of pollock trawl gear may have significant localized effects on seabird prey. NMFS concluded that disruption of fish schooling dynamics may occur over a period of minutes to hours in trawled areas, and localized depletions may persist longer.[406] These disruptions and depletions of the prey field will have significant effects on the foraging success of seabirds and marine mammals in the trawled area.

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[402] North Pacific Fishery Management Council. Ecosystem Systems Considerations, in: Stock Assessment and Fishery Evaluation (SAFE) for North Pacific Groundfish in 2001, November 2000, pp. 105-106.
[403] North Pacific Fishery Management Council. Ecosystem Systems Considerations, in: Stock Assessment and Fishery Evaluation (SAFE) for North Pacific Groundfish in 2001, November 2000, p. 106.
[404] Cited in: NMFS November 2000 Steller sea lion FMP BiOp, p. 228.
[405] NMFS November 2000 FMP BiOp, p. 229.
[406] NMFS November 2000 FMP BiOp, pp. 187, 229.

The current management of the pollock fisheries does not address foraging habitat protection around breeding/nesting colonies. Trawl exclusion zones in nearshore sea lion critical habitat may confer some protective benefit to seabird foraging grounds in the vicinity of some colonies. However, pelagic foraging habitats outside protected critical habitat boundaries may become the focus of pollock fishing effort displaced from sea lion habitat by nearshore trawl exclusion zones. The Draft PSEIS acknowledged that existing trawl closure areas in the North Pacific FMPs do not encompass pelagic habitats on the continental shelf breaks and upper slopes: "There are generally no area restrictions in the deeper waters that encompass the outer continental shelf and upper slope of the central and western GOA and BSAI."[407]

For instance, biologically productive areas of the Bering Sea shelf break such as the "Horseshoe" area of Unimak Pass, Pribilof Canyon southwest of St. George Island and Zhemchug Canyon northwest of St. Paul Island are major pollock fishing grounds, accounting for nearly one-fifth of the Bering Sea pollock catch 1997-1999. Data from trawl surveys indicate that these are areas of high squid abundance, and Observer Program fishery indicate that they are also areas of high squid bycatch.[408] As fixed bathymetric features, these submarine canyons represent predictable "hotspots" of high productivity in areas of strong, persistent upwelling along the shelf break.[409] At-risk seabird species such as albatrosses are found over the continental slope and shelf break in these areas.[410] These nutrient-rich, highly productive pelagic zones provide food such as squid, myctophids (lanternfish), and other fish or invertebrates for albatrosses, shearwaters, kittiwakes, murres and other bird species. Availability appears to determine choice of prey for surface-feeding albatrosses, for instance, and surface-feeding limits availability of prey.[411]

The management system has not addressed the impacts of the pollock fishery in these areas. However, the Draft PSEIS noted that such areas make ideal candidates for pelagic trawl closure areas as the most efficient way to reduce squid bycatch in the pollock fisheries:

> "These closures apply only to pelagic trawl gear in the Bering Sea (almost exclusively the pollock fishery)…Year-round closures in these areas is a conservative measure that will provide protection to all cohorts in the populations of each species that potentially occupies the area…The estimated total pollock fishery catch in each year (1997-1999) that would have been displaced by these closures…reduced the pollock TAC by 18.5%, the average proportion of the displaced catch from these three years (Table 4.1-27)"[412]

[407] NMFS 2001 Draft PSEIS 4.7, p. 19
[408] NMFS 2001 Draft PSEIS 4.1, p. 107, Table 4.1-27, Fig. 4.1-19.
[409] NMFS 2001 Draft PSEIS, Sec. 3.3, p. 53; 3.5, pp. 7, 24.
[410] NMFS 2001 Draft PSEIS, Sec. 3.5, p. 7.
[411] NMFS 2001 Draft PSEIS, Sec. 3.5, p.12.
[412] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 107, Table 4.1-27, Fig. 4.1-19.

2.2.2 Indirect and cumulative effects of pollock fishery on prey availability

In addition to localized effects on the prey field, there may be substantial indirect and cumulative effects of the $F_{40\%}$ harvest policy on the annual production and availability of juvenile age classes of pollock, i.e., competitive interaction over time. The November 2000 FMP BiOp found that the $F_{40\%}$ harvest policy has reduced important sea lion prey stocks to 40-60% of the expected average unfished stock size over time, by design. The goal of the MSY-based harvest policy is to remove fish before they are "lost" to natural mortality by other ecosystem consumers.[413] In short, the MSY concept of "surplus production" fails to consider predator-prey relationships and the needs of competing predators in an ecosystem context. This long-term reduction in the average spawning stock sizes of exploited prey fishes such as pollock will reduce overall egg production and may ultimately affect the availability of juvenile pollock to the ecosystem over time. Myers found that recruitment variability generally increased at low population sizes for fish species with higher fecundity.[414] For species such as pollock with high fecundity and variable recruitment, the long-term effects of fishery exploitation on the recruitment, age structure, egg production and distribution of pollock populations will affect the annual production of age-0 pollock to the ecosystem as well as the frequency of production of large pollock year classes that become available to pollock-eating seabirds off Alaska.

The current management of the pollock fisheries does not consider these cumulative effects on seabird pollock predators.

2.2.3 Pollock is a major seabird prey in many areas

Key forage fish species in Alaska include juvenile pollock, sand lance, capelin, herring, Atka mackerel, Pacific cod, and myctophids (lanternfish). "For the piscivorous birds of the Pribilofs, the dominant prey is juvenile walleye pollock (*Theragra chalcogramma*) and, to a lesser extent, sand lance and lanternfish. (Hunt et al. 1981a,b; 1996; Schneider and Hunt 1984; Decker et al. 1995)."[415] Around the Pribilof Islands, reproductive success of many fish-eating birds appears to be linked to availability of abundant supplies of age-1 pollock.[416] Available information clearly indicates the importance of juvenile pollock to seabird breeding colonies in many regions of coastal Alaska:

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[413] NMFS November 2000 FMP BiOp at p. 225: "In effect, fisheries remove fish from the population before they are 'lost' to natural mortality (e.g., other consumers of groundfish)."

[414] Ransom A. Myers. Stock and recruitment: generalizations about maximum reproductive rate, density dependence, and variability using meta-analytic approaches. ICES Journal of Marine Science, 58: 937-951, 2001.

[415] George L. Hunt and G. Vernon Byrd, Marine Bird Populations and Carrying Capacity of the Eastern Bering Sea, pp. 631-650. *In*: Thomas R. Loughlin and Kiyotaka Ohtani (eds.), Dynamics of the Bering Sea, Alaska Sea Grant College Program, AK-SG-99-03 (1999) p. 838.

[416] North Pacific Fishery Management Council. Ecosystem Systems Considerations, in: Stock Assessment and Fishery Evaluation (SAFE) for North Pacific Groundfish in 2001, November 2000, p. 100.

- Large seabird colonies rely on annual production of dense schools of pelagic juvenile pollock (age 0-1) in the critical breeding and chick-rearing season in the eastern Bering Sea. At the Pribilof Islands, for instance, age-0 and age-1 pollock have commonly been the most important prey for large breeding colonies of black-legged kittiwakes and common murres, as well as an important food source for red-legged kittiwakes and thick-billed murres.[417]
- Based on summer food habits data, pollock comprised 60-70% of the diets of nesting murres and black-legged kittiwakes on the Pribilofs, and 70-90% of murres and black-legged kittiwakes on St. Matthew Island. Pollock consumption by red-legged kittiwakes was thought to be considerably lower as a percentage of overall diet (2-24%) but still an important component.[418]
- Pre-recruit pollock are important prey for nesting seabirds at St. Matthew Island, Pribilof Islands, and Bogoslof Island in the eastern Bering Sea, common in the diets at Cape Pierce and Cape Newenham in Bristol Bay, and probably common in some areas of the Aleutian Islands and in the western Bering Sea. Juvenile pollock was common in the diets of murres caught offshore in gillnets in the southeastern and northwestern Bering Sea. In addition, ages 1-2 pollock may be important to seabirds on the ice edge in the eastern Bering Sea during the winter months, having been found in 60-100% of five different species of seabirds sampled in 1976.[419]
- Using data from 1985, Livingston (1993) estimated eastern Bering Sea pollock biomass consumption for pinnipeds (257,000 mt), seabirds (272,000 mt), fishes (3.86 million mt) and the fishery (1.18 million metric tons), totaling 5.57 million metric tons in 1985 (Table 5).[420]
- In the eastern Aleutian Islands, prey items identified in the stomachs of adult birds collected in 1995 showed that pollock were the most common prey (72-86%) consumed by tufted puffins, horned puffins, common murres and pigeon guillemots. Of fish observed being delivered to tufted puffin chicks, 78% was identified as juvenile pollock.[421]
- Tufted and horned puffins at the Semidi and Shumagin Islands in the western Gulf of Alaska consume juvenile pollock in moderate amounts. Tufted and horned puffin

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[417] G.L. Hunt, Jr., A.S. Kitaysky, M.B. Decker, D.E. Dragoo, A.M. Springer. Changes in the distribution and size of juvenile walleye pollock, Theragra chalcogramma, as indicated by seabird diets at the Pribilof Islands and by bottom trawl surveys in the eastern Bering Sea, 1975 to 1993. In: Ecology of Juvenile Walleye Pollock, Papers from the workshop “The Importance of Prerecruit Walleye Pollock to the Bering Sea and North Pacific Ecosystems,” Richard D. Brodeur, Patricia A. Livingston, Thomas R. Loughlin, Anne B. Hollowed, eds. NOAA Technical Report NMFS 126 (December 1996).

[418] A.M. Springer. Report of the seabird working group. In: Is It Food? Alaska Sea Grant Report 93-01 (1993).

[419] Alan M. Springer. 1996. Pre-recruit walleye pollock, Theragra chalcogramma, in seabird food webs of the Bering Sea (abstract), pp. 198-201, In: U.S. Dep. of Commer. NOAA Tech. Report NMFS 126.

[420] P.A. Livingston. Importance of predation by groundfish, marine mammals and birds on walleye pollock, Theragra chalcogramma, and Pacific Herring, Clupea pallasi, in the eastern Bering Sea. Marine Ecology Progress Series, Vol. 102 (1993): 205-215.

[421] G. Vernon Byrd, Richard L. Merrick, John F. Piatt, and Brenda L. Norcross. Seabird, Marine Mammal, and Oceanography Coordinated Investigations (SMMOCI) Near Unimak Pass, Alaska: An Ecosystem Approach to Monitoring. USFW/Alaska Maritime National Wildlife Refuge, January 1997.

pollock consumption is heavy at the Sandman Reefs in the western Gulf of Alaska and eastern Aleutian Islands.[422]

To date, most monitoring and diet studies have been conducted during the summer breeding and nesting season but not in the winter half of the year. However, ages 1-2 pollock may also be important to seabirds on the ice edge in the eastern Bering Sea during the winter months, having been found in 60-100% of five different species of seabirds sampled in 1976.[423] Winter habitat, foraging ranges and diets are poorly understood for most species, but species such as common murres are known to spend winters in the southeastern Bering Sea, as evidenced by the very high densities observed in winter pelagic surveys. Pollock are a winter food of common murres. If the commercial pollock fishery is impacting the food supply (e.g., via direct effects of bycatch or indirect effects on production of juvenile pollock), the over-winter survival of the birds could be reduced. Young, inexperienced murres would likely be the first to succumb to a decline in food availability.[424]

2.2.4 Large seabird colonies in the southeastern Bering Sea are a high risk

The southeastern Bering Sea supports some of the largest concentrations of seabirds in the world, with pollock being an important prey for kittiwakes and murres in this region. On the Pribilof Islands, thick-billed murres and red- and black-legged kittiwakes all declined by an average of 40% by the late 1980s, with red-legged kittiwakes experiencing the sharpest decline of 50%.[425] The declining bird populations in the Pribilof Islands appeared to be caused by food limitation appeared from failure to hatch or rear chicks. Observations of dying chicks in many years indicated that birds were food-stressed.[426]

Although some have argued that pollock is less nutritious than other fatty forage fishes and may be the reason for declines in seabird productivity, the available evidence indicates that seabird productivity on the Pribilof Islands declines when pollock is less available. The Ecosystem Considerations chapter of the 2001 groundfish SAFE report contains the following discussion:

"*At the Pribilof Islands, there has been a shift from capelin to sandlance as the fatty forage fish available to diurnal seabirds (Decker al. 1996). At the Pribilof Islands there has also been a decline in the use and abundance of age-1 pollock (Hunt,*

[422] S. A. Hatch, and G. A. Sanger. Puffins as samplers of juvenile pollock and other forage fish in the Gulf of Alaska. Mar. Ecol. Prog. Ser. 80 (1992): 1-14.

[423] Alan M. Springer. Pre-recruit walleye pollock, *Theragra chalcogramma*, in seabird food webs of the Bering Sea (abstract), pp. 198-201, In: U.S. Dep. of Commer. NOAA Tech. Report NMFS 126, 1996.

[424] Murphy, E.C., A.M. Springer, and D.G. Roseneau. 1985. Population status of common murres, *Uria aalge*, at a colony in western Alaska. Ibis 128: 348-363.

[425] A.M. Springer. Report of the seabird working group. In: Alaska Sea Grant Report 93-01 (1993).

[426] A.M. Springer. Report of the seabird working group. In: Alaska Sea Grant Report 93-01 (1993).

Kitaysky et al. 1996). In an analysis of diet changes of seabirds at the Pribilof Islands, Hunt, Decker et al. (1996) suggested that the decline in the use of fatty fishes, including myctophids, was correlated with reduced reproductive success. However, when pollock dropped significantly in diets and kittiwakes were forced to rely primarily on the fatty forage fishes that may have been scarce, reproductive success was also diminished. It appears, then, that at the Pribilofs, whether because the colonies are so large, or because fatty forage fishes are generally scarce there, an abundant supply of pollock, preferably age-1 pollock, is important."

From 1983-1993, in the Bering Sea at least 5 large wrecks (die-offs) of murres, kittiwakes, and shearwaters occurred, all but one event attributed to starvation.[427] In the summer and early fall of 1997, another large wreck of short-tailed shearwaters was reported in the southeastern Bering Sea in which as many as 200,000 birds may have died presumably from starvation. Short-tailed shearwaters nest in southeastern Australia and migrate to the Bering Sea to forage from May-October. Although they eat a wide variety of prey in the North Pacific, in the shelf areas of the southeastern Bering Sea and Bristol Bay where the die-off occurred, as much as 80-100% of the diet had been comprised of euphausiids (krill) captured in the upper 35 meters of the water column. The causes of this mass starvation are unclear, but warm sea conditions and anomalies in the thermocline (thermally stratified water layers) may have been the culprits.[428] Significantly, surviving short-tailed shearwaters shifted to squid and juvenile pollock. While the groundfish fisheries may not have contributed to the die-off of 1997, the availability of species such as pollock may be critical at times when other prey are not available.

3. The "Regime Shift" theory does not adequately explain the declines in the productivity of the North Pacific ecosystem.

Although some scientists and pollock industry officials hypothesize that carrying capacity of the ecosystem has declined appreciably over the last thirty years due to a "regime shift," NMFS's findings do not support this theory. The regime shift theory asserts that precipitous declines of species as various as Steller sea lions and red king crab have occurred in the North Pacific due to bottom-up oceanographic forcing ("regime shift") and an "explosion" of reputedly suboptimal gadids (particularly pollock). NMFS's findings in the November 2000 FMP BiOp demonstrate that species such as pollock were abundant before the regime shift and did not take over the ecosystem after the regime presumably shifted from one set of average conditions to another.[429] Both the November 2000 FMP BiOp and 2001 RPA BiOp concluded that conditions for many wildlife prey species actually improved with the 1976-1977 "regime shift," and the benefits of increased productivity from a large number of potential prey stocks would be as likely to increase the ecosystem carrying capacity for top predators as to decrease it.[430] In addition, the 1977 "regime shift" coincided with a major management shift under the Magnuson Act and rapid expansion of the domestic fisheries in the BSAI and GOA, confounding the ability to differentiate between natural and human effects.

[427] NRC. The Bering Sea Ecosystem. National Academy Press, Washington D.C., 1996, p. 118.
[428] S.A. Macklin (editor). Report on the FOCI International Workshop on Recent Conditions in the Bering Sea, Seattle, WA., November 9-10, 1998. NOAA/Pacific Marine Environmental Laboratory, January 1999, pp. 28-29.
[429] NMFS November 2000 FMP BiOp, pp. 133-134.
[430] NMFS November 2000 FMP BiOp, p. 137; NMFS November 2001 RPA BiOp, p. 76.

As discussed by Francis *et al*. (1998), the fundamental question underlying regime shift theory is: does climate effect rapid shifts in the organization of marine ecosystems and, if so, on what time and space scales can these effects be measured?[431] In other words, (1) does the North Pacific have multiple equilibrium states based on changes in climate regimes, and (2), in the context of the decline of major pollock predators at higher trophic levels, could such environmental changes cause a crash in carrying capacity for top predators that evolved in this system? Lack of reliable long-term baseline abundance information to compare recent conditions with past conditions further confounds efforts to assess the environmental changes from one regime to the next and their potential impacts on top predators. It is also important to note that scientists have not demonstrated a clear relationship between cycles of environmental change and productivity of individual fish populations.[432]

The Steller sea lion crash and the accompanying declines of other top predators in the North Pacific food web indicate that there has been a major change in the structure of the ecosystem in recent decades.[433] It would appear that the ecosystem carrying capacity for these predators has collapsed in the past three decades – that is, for some reason food supplies are limited or reduced and the ecosystem(s) cannot support these predator populations at the levels observed before the 1970s. There is no evidence, however, of reductions in the productive carrying capacity of the ecosystems of the North Pacific. To the contrary, massive fisheries dominated by pollock have flourished since the 1970s in areas that supported vast numbers of Steller sea lions, northern fur seals, harbor seals and other pollock predators historically.

Merrick (1997) discusses the hypothesis that both environmental and ecological changes caused declines of forage fishes such as herring and capelin, which in turn are hypothesized to have caused cascading trophic effects that contributed to the decline of top predators such as the Steller sea lion. He concludes that it is an open question, but he also notes that large Steller sea lion declines began in the eastern Bering Sea prior to the regime shift, but coincident with the introduction of large trawl fisheries for pollock and other species, and further observes that these predators have evolved life history strategies which should be expected to buffer them from drastic population responses to normal and recurrent environmental fluctuations of the kind implied by the regime shift theory:

> "Furthermore, the life history and foraging characteristics of marine mammals and seabirds suggest that regular decadal shifts in fish biomass should not produce large (>50%), chronic declines in their populations."[434]

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[431] Robert C. Francis, Steven R. Hare, Anne B. Hollowed, and Warren S. Wooster. Effects of interdecadal climate variability on the oceanic ecosystems of the NE Pacific. Fish. Oceanogr. 7:1 (1998), 1-21.
[432] NMFS November 2000 FMP BiOp, p. 132.
[433] Richard Merrick. Current and Historical Roles of Apex Predators in the Bering Sea Ecosystem. Journal of Northwest Atlantic Fisheries Science, Vol. 22, 1997: 343-355.
[434] Richard Merrick. Current and Historical Roles of Apex Predators in the Bering Sea Ecosystem. Journal of Northwest Atlantic Fisheries Science, Vol. 22, 1997: 343-355. Also NMFS November 2000 FMP BiOp, p. 253.

Proponents of regime shift theory claim that fatty-rich species such as herring were a more important prey item for species such as Steller sea lion before the regime shift, based on extremely limited food habits research by Thorsteinson and Lensink (1962), Mathisen *et al*. (1962), and Fiscus and Baines (1966). Close scrutiny of the results of those studies reveal that neither herring nor capelin were dominant in the diet of animals sampled from rookeries during that period. In fact, herring abundance in the Gulf of Alaska was so low during the 1960s that the decades-old herring reduction fishery was closed in 1966, while the herring stock in the eastern Bering Sea was reportedly fished to low levels of abundance by Soviet trawlers during the 1960s.[435] Additionally, herring recruitment in the North Pacific is favored by "warm" sea surface conditions, as noted in the 1996 National Research Council Bering Sea Ecosystem Report, and the "warm" years of 1957, 1958, and 1977 in the Bering Sea were accompanied by strong herring (as well as pollock) year classes.[436] Proponents of the regime shift theory do not explain how these trends fit their theory of environmental forcing as an explanation for top predator declines, based on suppositions about the effects of regime shifts on community structure of species and changes in the food base.

No direct evidence from the fisheries and research programs supports the theory that a naturally occurring "regime shift" has caused the collapse of natural carrying capacity of the ecosystem for top predators such as the Steller sea lion and northern fur seal, such that today the ecosystem can support only 10-15% of the sea lions and 40% of the fur seals that flourished in the 1960s. Certainly NMFS provides no firm basis for concluding that current ecosystem carrying capacity is 80-90% less than it was in the 1960s or 1970s. In fact, NMFS provides compelling arguments to the contrary. For instance, the model estimates of pollock biomass from the 1960s and early 1970s indicating low pollock biomass are at odds with the large catches of pollock in the Bering Sea from the mid-1960s to mid-1970s:

> *"Catches of pollock spawned before the regime shift were high. . . The data presented here suggest that walleye pollock comprised the majority of groundfish catches in the BSAI and GOA for almost a decade before the regime shift."*
>
> "*While biomass was high before the shift, it is also reasonable to conclude that the 1976-1977 regime shift produced some very large year-classes of gadids (walleye pollock and Pacific cod). At the same time, the regime shift produced large year classes of other groups, including salmonids (Pacific salmon), clupeids (Pacific herring), scorpaenids (sablefish, Pacific ocean perch, and other rockfish), anoplomatidae (sablefish), and pleuronectids (Pacific halibut) among others (see Beamish 1993). The effects of the regime shift on the productivity of marine species was not limited to the BSAI and GOA. Large year classes were produced as far south as California (Beamish 1993).*"[437]

The FMP BiOp concludes that the hypothesis about the regime shift and its purported effects on gadid fishes is unsupportable, based on the available evidence:

> *"NMFS cannot support the hypothesis that the regime shift favored gadids in a way which would allow them to outcompete other fish species and dominate the ecosystem, although the absolute level of biomass is not well known. . . From the information available, it seems reasonable to conclude that gadids (i.e., pollock and Pacific cod) were abundant before the regime shift, and that sea lions relied on them for food before the decline. Therefore, it is unlikely that a change in the structure of the ecosystem, resulting in a dominance of gadids, is the sole cause of the current decline."*[438]

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[435] If the eastern and western Bering Sea herring catch records are accurate, they suggest that herring abundance at that time was about one-tenth the size of the eastern Bering Sea pollock population. *See* NRC Bering Sea Ecosystem Report 1996, pp. 162-163, Figure 5.4, and p. 172, Table 5.1.

[436] See NRC Bering Sea Ecosystem Report 1996, p. 206: "...the three largest year classes of [EBS] herring (1957, 1958, and 1977) occurred at times of significant warming in the North Pacific..."

[437] NMFS November 2000 FMP BiOp, p. 133.

[438] NMFS November 2000 FMP BiOp, p. 134.

Indeed, pollock stocks declined 88% in the annual Gulf of Alaska Shelikof Strait acoustic surveys from the early 1980s to 2000, and declined 50-88% in the Aleutian Islands and Bogoslof Island/ regions – coincident with intense fisheries that substantially concentrated on pollock spawning grounds. Meanwhile cod biomass has been declining in the eastern Bering Sea and Gulf of Alaska since the late-1980s during the period of record-setting catches. Thus, these trends do not support the argument for the "explosion" of gadids after the 1977 regime shift, but they do suggest how pollock predators may have suffered from reduced supplies of an important dietary staple.

X. NORTH PACIFIC BYCATCH REGULATIONS AND THE POLLOCK FISHERY

1. Limitations of bycatch caps as a management tool to reduce bycatch

A primary objective of the early North Pacific FMPs was to foster the development of a domestic groundfish trawl fleet.[439] The explosive growth of the trawl fleet has had enormous impacts on the management regime's ability to control bycatch. Starting in the 1980s, a series of bycatch limits have been established to "keep the bycatch from reaching higher levels," as described by Witherell and Pautzke (1997):

> ***"Beginning in 1982 with implementation of the BS/AI groundfish FMP, regulations and incentives for foreign fisheries worked to control the bycatch of halibut, crab and salmon. Bycatch of these species remained low through 1985, but then increased with development of relatively unconstrained joint-venture operations. . . Bycatch further increased with development of the fully domestic fleet but was quickly limited by regulations. Bycatch limits for Pacific halibut, Pacific herring, red king crab and Tanner crab kept the bycatch from reaching higher levels. Bycatch of salmon remained unconstrained through 1994, and bycatch of C. opilio [snow crab] remained unconstrained through 1997."***[440]

Despite official assurances that growing bycatch problems were "quickly limited by regulations," the fact remains that by the mid-1990s groundfish bycatch/discards for the BS/AI and GOA averaged about 300,000 metric tons (>600 million pounds) annually. Factory trawlers and shorebased trawlers, accounted for over 90% of the bycatch with the Bering Sea factory trawlers responsible for the vast bulk of it. (Pacific Associates 1995, 1998, Table 16 below.) How effective, then, were the bycatch regulations beyond maintaining the bycatch to already high levels?

Table 16. – Catch, PSC/Bycatch and Discards in the North Pacific Groundfish Fisheries, 1993-1997

[439] NPFMC, Final Regulatory Impact Review for the Bering Sea/Aleutian Islands Area Groundfish Fishery Management Plan of the North Pacific Council, August, 1981, pp. 14-15.
[440] David Witherell and Clarence Pautzke. A Brief History of Bycatch Management Measures for Eastern Bering Sea Groundfish Fisheries. Marine Fisheries Review, 59(4), 1997, pp. 15-22.

	1993	1994	1995	1996	1997	
Total Catch (mt)	2,099,035	2,236,587	2,056,472	1,945,654	1,940,764	
Total Discards (mt)	335,759	340,738	294,231	279,833	292,413	
Total Discards (lbs)	740,214,291	751,190,995	648,661,663	616,919,832	644,653,700	
Percent Discarded	16%	15%	14%	14%	15%	
Halibut Mortality (lbs)	16,714,071	17,276,205	14,960,000	14,926,000	14,620,000	
Herring (lbs)	770,260	3,994,668	1,038,000	3,561,000	2,515,000	
Chinook Salmon (#s)	70,683	58,538	36,678	78,638	63,231	
Other Salmon (#s)	301,528	137,112	86,103	82,288	66,578	
Red King Crab (#s)	243,701	281,100	39,971	106,747	74,634	
Other King Crab (#s)	100,875	83,355	19,897	22,304	29,093	
Bairdi Tanner Crab (#s)	3,415,572	2,618,771		2,223,306	2,291,576	2,262,152
Other Tanner Crab (#s)	12,915,471	12,495,390	5,052,305	3,830,046	5,654,941	

Source: Pacific Associates, Inc. and Fisheries Information Service. Discards in the Groundfish Fisheries of the Bering Sea/Aleutian Islands & Gulf of Alaska, 1995-1997. Prepared for Alaska Department of Fish & Game. September, 1998.

Prohibited Species Catch (PSC) limits for halibut, crab, salmon, and herring are a principle tool for regulating and constraining bycatch in the BS/AI, accompanied in the latter half of the 1990s by the addition of trawl gear closure areas and bycatch-triggered closure areas in the BS/AI.[441] However, the system of PSC/bycatch caps has serious limitations that are often ignored, including:

1. The information is expensive to acquire on a regular and timely basis, and is subject to large error bounds.
2. The caps are only effective if biological assumptions and species abundance indices correspond to real conditions.
3. The caps are only effective with high levels of observer coverage and thorough sampling of the catch.
4. The caps do not account for the uncounted crustaceans, mollusks, and other benthic life that are crushed or maimed by trawl gear and left on the seabed, and therefore they understate the full impacts.
5. Bycatch caps provide no protection to seabed habitat from trawl gear disturbance and damage.

Regulations limiting the incidental catch of a few commercially desirable species in the BS/A,I while important are no panacea. In the GOA groundfish fisheries, only halibut PSC caps exist. Thus, the fact that bycatch limit regulations have been enacted for the pollock fisheries should not be taken at face value as evidence that the environmental impacts of bycatch are adequately addressed by the management regime.

2. Problems of the North Pacific Observer Program in bycatch monitoring

There are serious shortcomings in the existing Observer Program, including the lack of a system of adequate and equitable fees to fund the program. There has been no progress

[441] NMFS 2001 Draft PSEIS, Sec. 4.6.1.2.

by NMFS or the Council's Observer Committee to address long-standing shortcomings in Observer Program objectives, designs, sampling protocols and data gaps.[442]

Accounting for catch and bycatch levels in the FMP species categories is seriously hampered by lack of observer coverage for much of the groundfish fleet operations and depends solely on extrapolations of total quantities of species that have been identified by observers. Since there is only 30% observer coverage for vessels in the groundfish fleet <125' LOA and no coverage for vessels <60' LOA, and since the smaller-sized vessels in the Gulf of Alaska groundfish fleet have only about 30% observer coverage overall,[443] estimates of total bycatch must be made with the assumption that bycatch aboard unobserved vessels is comparable to the quantities and species aboard observed vessels.[444]

For most non-commercial species, the vast majority of species in the North Pacific, there are no established limits of any kind on incidental catch. For non-target species in the FMP categories of "Other," "Forage Fish," and "Non-specified" species, the species-level information provided by the Observer Program is extremely limited. For instance, the observer database includes records of HAPC (habitat areas of particular concern) biota bycatch of corals, but no taxonomic identification by family, genera or species.[445] Most species in the FMPs' "Non-specified" category (e.g., snails, bivalves, ascidians, corals, sponges, urchins, anemones, tunicates, as well as most of the families of fishes that comprise the groundfish assemblage) are not monitored at all, even though they may play important ecological roles as food and living substrate for managed species. In addition, the North Pacific Groundfish Observer Program is not designed or adequately funded to provide such detailed information on the composition of the catch. Under the current Observer Program, observers have limited time or training to devote to the identification of many taxa to the species level that appear as bycatch in fishing gear from these categories (e.g., skates, sculpins, squid, or octopus), in addition to the fact that "other" (i.e., non-commercial) species are a low management priority.[446] At best, the Observer Program strives to achieve statutory objectives for accurate enumeration of the target species, prohibited species, and total catch measurement.

Another area of concern is where with in the net, the observer is sampling. Samples are frequently collected from only the beginning and/or end of the codend of the trawl net. If the codend has fish stratified, the observers may be biasing the data toward too little or too much bycatch. In addition, there is no clear protocol regarding observer sampling in the front section of the net upper meshes where bycatch species stay and do not make it into the codend of the trawl net. Therefore, there is inconsistent sampling of this area of the net – some observers monitor and some do not.

NMFS should address the consequences of the lack of information for the conservation and management of essential fish habitat, biological diversity and the sustainability of groundfish

[442] NMFS 2001 Draft PSEIS, Secs. 4.1.2.4, pp. 63-65: Record-keeping, Reporting, and Observer Program.

[443] NMFS 2001 Draft PSEIS Sec. 4.5, p. 7: "The size distribution of vessels fishing in the GOA results in approximately 30% observer coverage overall, although some target fisheries (trawl rockfish) are conducted on larger vessels with 100% observer coverage."

[444] Gaichas, S., L.W. Fritz, and J.N. Ianelli. 1999. Other species considerations for the Gulf of Alaska, Gulf of Alaska Plan Team, pp. 621-662. *In*: NPFMC, Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the Gulf of Alaska as Projected for 2000.

[445] NPFMC, Draft HAPC EA/RIR 1999.

[446] Gaichas, S., L.W. Fritz, and J.N. Ianelli. 1999. Other species considerations for the Gulf of Alaska, Gulf of Alaska Plan Team, pp. 621-662. *In*: NPFMC, Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the Gulf of Alaska as Projected for 2000.

assemblages that support managed species. An equitable funding mechanism should be developed to support a robust Observer Research Plan that accomplishes the goals and objectives of the MSFCMA for total catch measurement and other data needs necessary for the conservation, management, and scientific understanding of any fisheries under the Council's jurisdiction.[447] Improvements in identification and enumeration in all FMP species categories are required, as are funding and staff resources to accomplish those goals. Observer Research Plan program design, objectives, sampling protocols and methods for improving data all require improvements and better coordination by NMFS. A revamped Observer Program Research Plan should include:

- Vessel monitoring systems (VMS) for all groundfish vessels, as well as other monitoring tools (e.g., winch sensors, video equipment) where appropriate or feasible to enhance catch monitoring and measurement
- Observer coverage for all sectors of the groundfish fleet, including vessels <60'
- "Hotspot authority" to place observers and Observer Program staff aboard vessels in fisheries with high bycatch or other priority monitoring needs as determined by the program, based on statistically sound protocols
- Adequate resources and methods for improving identification and enumeration in all FMP species categories
- Whole-haul observer sampling on selected vessels to test assumptions of random sampling methodology, or as needed to improve total catch measurement and ensure that confidence in the data is high
- Requirement of motion-compensated scales to weigh all catches at sea, as well as improved catch measurement at shore-based processing plants
- Full federal funding for the Observer Program or a fee-based industry funding mechanism based on (1) a percentage of the unprocessed ex-vessel value of the fish and shellfish (such that smaller vessels with a smaller share of the catch are not unfairly charged and larger vessels with a larger share of the catch pay into the system proportional to the benefits of the public resource that they enjoy); and (2) a percentage of the estimated processed value (such that fishing vessels do no bear the sole cost of the program and processors who reap the largest economic benefits pay their fair share)

3. Limitations of existing gear closure areas as a management tool to reduce bycatch

NMFS has previously described the use of gear closure areas as a management tool to reduce PSC bycatch in the groundfish fisheries both before and after the FMPs were developed.[448] Included in the North Pacific Groundfish Draft PSEIS is a discussion of closed areas (Section 4.6.1.2) that provides a cursory historical review of measures to restrict foreign trawlers in the Crab Pot Sanctuary and Winter Halibut Savings Area, but the analysis of subsequent FMP amendments to limit bycatch in these areas sheds no light on their cumulative effects on prohibited species and their habitats in the areas of the former Crab Pot Sanctuary and Winter Halibut Savings Area that remained open to domestic trawlers under Amendment 1. The discussion of Amendment 1 and of subsequent BS/AI FMP amendments to reduce high levels of bycatch of prohibited species such as crab, halibut, salmon and herring makes no attempt to evaluate the effectiveness of those amendments in addressing impacts on prohibited species and their habitats, although one could infer from the ongoing

[447] 16 U.S.C. 1853 et seq.
[448] NMFS 2001 Draft PSEIS, Sec. 4.6, pp. 5, 13.

twenty-year regulatory history that progress in addressing impacts has been incremental and piecemeal at best. In addition, little attention has been given to the near-absence of gear closure areas in the Gulf of Alaska groundfish fishery.

The Council and NMFS have stated that there are large areas closed to groundfish trawling, attempting to demonstrate that they have taken adequate measures to minimize the groundfish fisheries' bycatch. The North Pacific Groundfish Draft PSEIS provides a time series of groundfish trawl closure areas in BS/AI/GOA, 1995-1999.[449] A notable feature in this table is the sudden addition of closure areas beginning in 1995, reflecting management responses to high levels of trawl PSC bycatch and the impacts of trawling on crab and marine mammal habitat. A total area of 94,602.5 nm^2 (324,863 km^2) is closed year-round to trawling or bottom trawling gear in the action area – about 30% of the continental shelf area <200 m depth. It is important to recognize, however, that over half of that area - 52,600 nm^2 (55%) - is in Southeast Alaska, far away from the main trawl fishing grounds of western Alaska:

Year-Round Trawl Closure Areas[450,451]

Nearshore Bristol Bay closure:	19,000 nm^2 (BSAI Amend. 37)
Pribilof Is. Habitat Conservation Area:	7,000 nm^2 (BSAI Amend. 21a)
Red King Crab Savings Area (RKCSA):	4,000 nm^2 (BSAI Amend. 37)
Southeast Alaska no-trawl area:	52,600 nm^2 (GOA Amend. 41)
Sitka Pinnacles Marine Reserve:	2.5 nm^2 (GOA Amend. 59)
Cook Inlet nonpelagic trawl:	7,000 nm^2 (GOA Amend. 60)
Kodiak red king crab zone:	1,000 nm^2 (GOA Amend. 26)
Sea Lion rookery no-trawl zones:	22,000 nm^2 (BSAI Amend. 20/ GOA Amend. 25)
TOTAL:	94,602 nm^2

IN ADDITION TO THE YEAR-ROUND TRAWL CLOSURE AREAS, THERE ARE SEASONAL OR BYCATCH-TRIGGERED TRAWL CLOSURE AREAS. A TOTAL AREA OF 218,000 NM^2 (NOT INCLUDING THE WALRUS SUMMER TRAWL EXCLUSION ZONES IN BRISTOL BAY AND STELLER SEA LION SEASONAL POLLOCK TRAWL CLOSURE AREAS OF 1999-2000) IS POTENTIALLY UNDER PROTECTION AT SOME TIME OF YEAR, BUT THE SEASONAL CLOSURE AREAS ARE EITHER SHORT-LIVED OR TRIGGERED ONLY WHEN PROHIBITED SPECIES BYCATCH LIMITS ARE REACHED.[452] IN PRACTICE, THE BYCATCH CLOSURE AREAS ARE RARELY TRIGGERED AND THEREFORE HAVE LITTLE EFFECT ON THE STATUS QUO OPERATION OF THE GROUNDFISH TRAWL FLEET. ALTHOUGH MANY MEMBERS OF THE COUNCIL AND INDUSTRY HAVE DEMANDED EXPERIMENTS TO TEST OF THE EFFICACY OF THE STELLER SEA LION TRAWL EXCLUSION ZONES AROUND ROOKERIES AND HAULOUTS, THERE HAS BEEN NO SIMILAR REQUEST TO TEST THE EFFICACY OR THE PERFORMANCE OF THE BYCATCH-TRIGGERED CLOSURE AREAS. THERE IS NO AVAILABLE DATA WITH WHICH TO EVALUATE THE PERFORMANCE OF THESE CLOSURE AREAS IN REDUCING BYCATCH OR PROTECTING BENTHIC HABITAT AND SO THEIR PRACTICAL UTILITY IS UNCLEAR.

[449] NMFS 2001 Draft PSEIS, Table 4.7-2, p. 5.
[450] NMFS 2001 Draft PSEIS, Sec. 4.6, p. 7-8.
[451] NMFS 2001 Draft PSEIS, Sec. 4.9, Fig. 2.
[452] NMFS 2001 Draft PSEIS, Sec. 4.7, p. 6.

Seasonal Trawl Closure Areas

Chum Salmon Savings Area…………………5,000 nm2 (BSAI Amend. 35)
(August only)

Chinook Salmon Savings Area……………..…9,000 nm2 (BSAI Amend. 21b/58)
(bycatch trigger)

Herring Saving Areas (3).…………………...30,000 nm2 (BSAI Amend. 16a)
(2 summer, 1 winter)

Tanner crab bycatch zones.………………….80,000 nm2 (BSAI Amend. 12a)
(bycatch trigger)

Area 516 seasonal closure…………………… 4,000 nm2 (BSAI Amend. 12a)
(king crab molting season)

Opilio Tanner crab bycatch zone…………….90,000 nm2 (BSAI Amend. 40)

*TOTAL: 218,000 nm2 (maximum potential)

* Steller sea lion and Bristol Bay walrus seasonal closure areas not included.

Trawl closure areas adopted by the North Pacific Council provide important habitat protection from the adverse impacts of trawling gear on crab stocks, on marine mammals, and on nearshore benthic habitat generally, but their efficacy at reducing the impacts of pollock fishery bycatch in areas heavily utilized by the pollock trawl fleet is not demonstrated by any analysis.

Finally, it should be noted that the existing system of trawl closure areas does not accomplish the aim of marine protected areas to provide refuges from all fishing and from the effects of fishing on habitat.[453] Only the tiny Sitka Pinnacles Marine Reserve (totaling 2.5 nm^2) in Southeast Alaska and 3 nm no-entry zones around selected sea lion rookeries and haulouts accomplish the intent of marine protected areas to serve as "spatially defined area[s] in which all populations are free of exploitation" (NRC 1999). In addition, there are no explicit habitat protection measures for exploited groundfish stocks at any life history stage.[454]

4. North Pacific fishery bycatch regulations are not adequate as designed to address the environmental impacts of incidental catch in the pollock fisheries

[453] NMFS 2001 Draft PSEIS, Sec. 4.7, p. 10: "Most protected areas off Alaska allow fishing by gear other than trawl gear and may therefore not meet all criteria for 'marine protected areas.'"
[454] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 53.

Prior to implementation of Improved Retention/Improved Utilization (IR/IU)[455] in 1998, the magnitude of pollock bycatch and discards in the pollock fishery were considered significant enough that they must be taken into account when estimating population size and forecasts of yield. Estimated discards of BS/AI pollock for 1990-96 totaled almost 800,000 mt, an average of about 114,000 mt/year – larger than most directed fisheries in the United States. NMFS cites the adoption of the Improved Retention/Improved Utilization program in as means of reducing economic discards dramatically after 1997:

> "This measure has dramatically reduced overall discards of groundfish [ ]. For example, in 1997, about 22,000 mt of cod (8.6 percent of the cod catch) and 94,800 mt of pollock (8.2 percent of the pollock catch) were discarded. In 1998, discards amounted to only 4,300 mt of cod (2,2 percent) and 16,200 mt of pollock (1.6 percent). A regulation requiring full retention of all demersal shelf rockfish species (e.g., yellow-eye rockfish) was adopted in 1999."[456]

Although IR/IU reduces economic discards and waste of unwanted pollock and cod in the directed pollock fishery, there is no evidence that the program reduces bycatch except to the extent that the provision requiring retention of all pollock and cod causes fishing vessels to modify fishing practices to avoid bycatch of pollock and cod. There is no information indicating that such modifications of fishing practices have occurred. Major sources of the pollock bycatch in the surimi factory trawl fleet, for instance, have on-board fishmeal plants and can simply grind the bycatch of unwanted fish (e.g., juvenile pollock) into meal.

Although the Sustainable Fisheries Act of 1996 required the North Pacific Council to reduce the total amount of bycatch by an annual amount for four successive years, the IR/IU regulations in the Bering Sea have not necessarily reduced bycatch of unwanted juvenile pollock and cod. In fact, the amount of pollock fish meal (which is the product of utilized pollock) produced has increased from an average of 30,000 mt/year during 1996-1998 to 48,500 mt/year during 1999-2000.[457] This nearly 60% increase in tons of fish meal produced suggests that IR/IU regulations have resulted in the grinding up of more pollock that would have been discarded prior to IR/IU. Since pollock and cod discards are prohibited, the discard rate has declined mostly recently – but the efficacy of IR/IU regulations in reducing bycatch has not been demonstrated. NMFS was supposed to report to Congress on the effectiveness of the IR/IU program in reducing bycatch but has failed to submit such a report.

5. Salmon bycatch in the pollock fisheries

The pollock fishery is the biggest source of salmon bycatch in the Bering Sea. Historically, pelagic trawl gear for pollock is responsible for most of the chinook salmon bycatch.[458] Although a bycatch limit of 48,000 chinook salmon was established in 1996, the limit was exceeded four times

[455] FMP Amendments 49/49 require the retention and utilization of all untargeted pollock, which is usually ground into fishmeal and sold.
[456] NMFS 2001 Draft PSEIS, Sec. 4.9, p. 13 (figure omitted).
[457] Terry Hiatt, Ron Felthoven and Joe Terry, Economic SAFE Status Report for Groundfish Fisheries Off Alaska, 2000. NPFMC, November 2001. Table 36.
[458] NMFS November 2000 Steller sea lion FMP-level BiOp, p. 163.

between 1994-1998.[459] On-board observers estimated approximately 60,000 intercepted chinook salmon each year between 1996 and 1998, as well as 60,000-80,000 others salmon – mostly in the pollock fishery.[460] In the 2001 Draft PSEIS, NMFS identified Bering Sea chinook bycatch as a significant proportion of the commercial catch:

> *"In Section 4.6.1.4, it was estimated that BSAI chinook bycatch of western Alaska origin would range from 23,000 to 32,000 fish for Alternative 1 (the status quo) in each of the next five years, without the proposed reduction in chinook salmon prohibited species caps. This estimate represents 10 to 25 percent of western Alaska commercial chinook salmon landings for 1997-1999, but only about 5 to 8 percent of the combined commercial and subsistence landings for 1997-1998...*"[461]

In the 2001 North Pacific Groundfish Draft PSEIS, NMFS provides a map showing the Bering Sea salmon savings areas and explains that these bycatch limitation zones go into effect upon attainment of a bycatch limit of 48,000 chinook salmon under Amendment 21b.[462] NMFS has not determined the effectiveness of the Chinook Salmon Savings Areas (bycatch limitation zones) at controlling, reducing or avoiding chinook bycatch. Nor has the agency determined how frequently the attainment of chinook bycatch limits have triggered the closure of these areas. Furthermore, NMFS has not evaluated the efficacy of bycatch limitation zones.

6. "Other species" bycatch in the pollock fisheries

The pollock fishery is the major source of squid bycatch in the BS/AI groundfish fishery. The North Pacific Groundfish Draft PSEIS, Section 4.1, Fig.18, illustrates the patchy distribution of squid species in bottom trawl and midwater surveys, concentrated near the shelf break and over submarine canyons that are part of the eastern Bering Sea "greenbelt"[463] running the entire length of the continental shelf break in a rich upwelling zone; this region is also preferred fishing grounds for the pollock fishery where approximately 19% of the Bering Sea pollock fishery catches occurred during 1997-1999.[464]

The patchy, discrete distribution of squid from surveys and observer data make squid an ideal candidate for fishery closure areas as the most efficient way to reduce squid bycatch in the pollock fisheries. The Draft PSEIS (Alternative 4) proposed the use of pelagic fishing gear closure areas as a conservation tool for squid bycatch management, in order to reduce the impacts of bycatch in the pollock fisheries on this poorly understood but ecologically important suite of species in the "Squid and Other Species" mixed-stock bycatch category of the FMPs:

> "These closures apply only to pelagic trawl gear in the Bering Sea (almost exclusively the pollock fishery)…Year-round closures in these areas is [sic] a conservative measure that will provide protection to all cohorts in the populations of each species that potentially occupies the area…The estimated total pollock fishery catch in each year (1997-1999) that would have

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[459] NMFS November 2000 FMP BiOp, p. 163.
[460] NMFS November 2000 FMP BiOp, p. 163.
[461] NMFS 2001 Draft PSEIS, Sec. 4.8, p. 98.
[462] NMFS 2001 Draft PSEIS, Sec. 4.6, p.8, Fig. 3.
[463] Alan M. Springer, C. Peter McRoy, and Mikhail V. Flint. The Bering Sea Green Belt: shelf-edge processes and ecosystem production. Fisheries Oceanography 5 (3/4), 1996: 205-223.
[464] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 107, and Table 4.1-27, Figs. 4.1-18, 4.1-19.

> been displaced by these closures…reduced the pollock TAC by 18.5%, the average proportion of the displaced catch from these three years (Table 4.1-27)"[465]

Although the frequency of occurrence of squid and other species as bycatch in the pollock fisheries may be low overall, Sinclair et al. (1999) caution that "the number of individuals caught when the species is encountered may be quite high."[466] Therefore, bycatch levels should be set so as not to jeopardize rare species that could be overfished even when biomass of the entire squid and other species "complex" is believed to high.

Given the size of the Bering Sea pollock fishery and importance of squid to protected marine mammals (e.g., northern fur seal, sperm whale) as well as the endangered short-tailed albatross and other non-breeding albatrosses that forage in these waters, this source of pollock fishery bycatch is a significant concern. The closure of these areas to the pollock fishery should be adopted as part of a comprehensive marine protected areas program addressing all habitat types, including identified pelagic hotspots of biological activity along the Bering Sea "Greenbelt."

XI. OVERCAPITALIZATION AND EXCESS CAPACITY

1. The pollock fisheries are overcapitalized

Prior to the 1976 Magnuson Fishery Conservation and Management Act, the North Pacific groundfish fishery "was largely an unmanaged high-seas fishery, open to any and all who wished to participate."[467] Domestication of the fishery was not completed until 1989, and was accompanied by an epic boat-building program.[468] By the early 1990s, the new fleet of Seattle-based factory trawlers dominated the open access fishery and fierce allocation wars erupted. In 1990, pollock factory trawlers were expelled from the Gulf of Alaska pollock fishery. In 1992, the first of the "Inshore-Offshore" pollock allocation battles pitted the shore-based processing plants and their associated catcher trawl fleets against the offshore factory trawl fleet. Amendments 18/23 (1992) to BS/AI and GOA FMPs (Inshore/Offshore 1) contained a Problem Statement identifying excess fishing capacity as the root of the conflict:

> "Both the inshore and offshore sectors of the Alaska groundfish industry have experienced rapid growth in the last few years; estimates of processing capacity indicate that this industry is capable of utilizing more than twice the current pollock and Pacific cod quota. This overcapitalization is increasing the competitive pressures on industry participants to obtain the volume of fish necessary to supply their processing capacity. In proposed Amendment 18/23, the Council has defined the underlying problem to be one of resource allocation, where one industry sector faces preemption by another."

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[465] NMFS 2001 Draft PSEIS, Sec. 4.1, p. 107, and Table 4.1-27, Figs. 4.1-18, 4.1-19.
[466] Elizabeth H. Sinclair, Andrey A. Balanov, Tsunemi Kubodera, Vladimir I. Radchenko and Yury A. Fedorets. Distribution and Ecology of Mesopelagic Fishes and Cephalopods. In: Dynamics of the Bering Sea, T. R. Laughlin and K. Ohtani, eds. University of Alaska Sea Grant, AK-SG-99-03, 1999, pp. 485-505.
[467] NMFS 2001 Draft PSEIS, Sec. 3.10, p. 2.
[468] Greenpeace. 1996. Sinking Fast: How Factory Trawlers Are Destroying U.S. Fisheries and Marine Ecosystems. A Greenpeace Report, written by Ken Stump and Dave Batker.

The ills of overcapacity are many and threaten the long-term health of the ecosystem as well as the viability of the industry:

> "The finite availability of fishery resources, combined with current and projected levels of harvesting and processing capacity and the differing capabilities of the inshore and offshore components of the industry, has generated concern for the future ecological, social and economic health of the resource and the industry. These concerns include, but are not limited to, localized depletion of stocks or other behavioral impacts to stocks, shortened seasons, increased waste, harvests which exceed the TAC, and possible preemption of one industry component by another with the attendant social and economic disruption."[469]

In a September 1994 draft of the License Limitation amendment proposal to the FMPs, those problems were spelled out in detail in a lengthy problem statement identifying fourteen specific problems associated with excess fishing capacity in the groundfish fisheries:

> "Expansion of the domestic fleet harvesting fish within the EEZ off Alaska, in excess of that needed to harvest the optimum yield efficiently, has made compliance with the Magnuson Act's National Standards and achievement of the Council's comprehensive goals, adopted December 7, 1984, more difficult under current management regimes… Symptomatic of the intense pressures within the over-capitalized groundfish and crab fisheries under the Council jurisdiction off Alaska are the following problems:
>
> Problem 1: Harvesting capacity in excess of that required to harvest the available resource.
> Problem 2: Allocation and preemption conflicts between and within industry sectors, such as with inshore and offshore components
>
> Problem 3: Preemption conflicts between gear types.
> Problem 4: Gear conflicts within fisheries where there is overcrowding of fishing gear due to excessive participation and surplus fishing effort on limited grounds.
> Problem 5: Dead loss such as with ghost fishing by lost or discarded gear.
> Problem 6: Bycatch loss of groundfish, crab, herring, salmon, and other non-target species, including bycatch which is not landed for regulatory reasons.
> Problem 7: Economic loss and waste associated with discard mortality of target species harvested but not retained for economic reasons.
> Problem 8: Concerns regarding vessel and crew safety which are often compromised in the race for fish.
> Problem 9: Economic instability within various sectors of the fishing industry, and in fishing communities caused by short and unpredictable fishing seasons, or preemption which denies access to fisheries resources.
> Problem 10: Inability to provide for a long-term, stable fisheries-based economy in small economically disadvantaged adjacent coastal communities.

[469] NMFS 2001 Draft PSEIS, Sec.1.2, p. 1-5.

Problem 11: Reduction in ability to provide a quality product to consumers at a competitive price, and thus maintain the competitiveness of seafood products from the EEZ off Alaska on the world market.
Problem 12: Possible impacts on marine mammals, seabirds, and marine habitat.
Problem 13: Inability to achieve long-term sustainable economic benefit to the nation.
Problem 14: A complex enforcement regime for fishermen and management alike which inhibits achievement of the Council's comprehensive goals"[470]

NMFS has concluded that excess capacity encourages risk-prone management: "overcapitalized fisheries can exert strong pressure for liberal catch quotas and other risk prone management" and "excess capacity may shorten seasons to a point at which fishing quotas cannot be accurately monitored."[471] But NMFS and the North Pacific Fishery Management Council have offered only a belated License Limitation Program (LLP) to address the problem of excess capacity. While the LLP closed the fisheries to new entrants, it was a case of too little, too late.

After many years of languishing, the License Limitation Program finally received Secretarial approval in January 2000. The LLP permits are based on the vessel catch history during the LLP qualifying period of January 1, 1988 to June 27, 1992. All told, there are a total of 2,203 overall LLP licenses for participation in one or more management areas of the North Pacific groundfish fisheries.[472] By comparison, the total number of catcher vessels and catcher/processors (all gear types) that fished for groundfish in 1999 was 1,358.[473] In other words, LLP does nothing to address the ills of overcapacity in the North Pacific groundfish fisheries by itself since LLP would allow nearly twice as many vessels to fish as are now participating in the fishery every year.

2. American Fisheries Act (AFA) does not significantly reduce excess catching and processing capacity, and does not address all the impacts of excess capacity in the pollock fisheries.

After three iterations of "Inshore/Offshore" allocation amendment at the North Pacific Fisheries Management Council over the course of the 1990s, the allocative battle and the race for fish in the Bering Sea pollock fishery remained unresolved. In the fall of 1998, the competing sectors of the Bering Sea pollock fleet met privately to hammer out a deal of their own. Negotiated with the help of Senators Stevens of Alaska and Gorton of Washington, the American Fisheries Act (AFA) was intended to end this fish war. Worked out between the factory trawlers and big Japanese-owned shore-based processing plants, the AFA awarded half the annual pollock catch to the shore-based sector of the pollock fleet as well the exclusive rights to process the catch to seven shore-based processing companies, worth roughly half a million metric tons of fish and hundreds of millions of dollars every year. The AFA also reduced the factory trawlers share of the catch from 50% to 40%, secured $90 million of public money to buy nine older factory trawlers out of the offshore fleet, and established offshore cooperative rights to the factory trawlers.

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[470] NMFS 2001 Draft PSEIS, Sec. 3.10, p. 11.
[471] NMFS 2001 Draft PSEIS, Sec. 4.9, p. 8.
[472] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 95, Table 2.7-18.
[473] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 114, Table 2.7-29.

The AFA is an example of how not to design a closed-access fishery. Even the name American Fisheries Act is ironic, since the AFA institutionalized foreign control over a large chunk of the largest fishery in the United States. Formerly Norwegian-controlled and Seattle-based, American Seafoods Company owns the largest, most powerful fleet of offshore factory trawlers and controls approximately 16% of the Bering Sea directed pollock quota, while six shore-based processing companies (most owned by Japanese transnational corporations) control 50%.[474] In essence, the AFA created a limited entry program for processors. Major concerns about the agreement have been raised that the AFA has created a monopoly cartel (the so-called "Pollockopoly") and will turn fishermen into little more than sharecroppers for the closed class of shore-based processing plants to whom they must deliver their catch.[475] In reality, groundfish processing plants reportedly owned all or part of 45-86% of their catcher boats delivering to those plants by 1998.[476]

Under the terms of the AFA, factory trawlers initially formed the Pollock Conservation Cooperative (PCC), and some catcher vessel owners formed the High Seas Catchers' Cooperative (HSCC) to enable members "to extract the maximum amount of value from fish that is available for harvest by cooperatively harvesting or arranging for the harvest of fish in the directed pollock fishery."[477,478] Under the AFA cooperatives, vessels can select times within the fishing seasons when they fish. Often cited benefits of the cooperatives include improved product utilization, reduced operational costs, and greater safety.[479] The industry also claims that the AFA cooperatives enable the pollock fishery to spread catches spatially and temporally and reduce daily or weekly catch rates, consistent with Steller sea lion protection measures.[480]

It is generally true that catch rates in the Bering Sea pollock fishery have declined under the AFA, with the largest reductions coming from the offshore factory trawl fleet.[481] For instance, the North Pacific Groundfish Draft PSEIS indicated that daily catch rates for the eastern Bering Sea pollock fishery decreased 22% in 1999, attributing the reduction to AFA pollock co-operatives.[482] However, the pollock fleet continues to concentrate catches in times and areas of preferred fishing as under the pre-AFA fishery, with large pulses of fishing occurring between January and April, and September and November. For instance, the 1999 Bering Sea pollock fishery showed no temporal dispersion of the fishery outside the January to March winter period, despite the claims of proponents that AFA co-ops will result in increased temporal dispersion of the fishery.[483] Nor has the AFA led to a

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[474] The six companies are: Nippon Suisan Kaisha (Unisea, Inc.), Nichiro Corp. (Peter Pan Seafoods, Inc.), Maruha Corp. (Westward Seafoods, Inc.), Maruha Corp. (Alyeska Seafoods, Inc.), Icicle Seafoods (Northern Victor), and Trident Seafoods (Akutan plant)

[475] Brad Warren, "Are Fish Cartels Coming Back?" Pacific Fishing, December 1998, p. 5.

[476] NPFMC, Impact Assessment Incorporated. 1998. Inshore/Offshore-3 Appendix II Socioeconomic Description and Social Impact Assessment., p. 65.

[477] Preliminary Joint Report of the Pollock Conservation Cooperative and High Seas Catchers' Cooperative. Presented to the North Pacific Fishery Management Council, December 1, 1999.

[478] Section 206(b)(2) of the AFA allocates 40% of the directed pollock fishery to factory trawlers and catcher vessels delivering to factory trawlers. The remaining 3.4% of the directed pollock fishery is the share belonging to catcher vessels delivering to factory trawlers. The PCC is made up of nine companies that own the twenty factory trawlers eligible under section 208(e)(1)-(20) of the AFA to catch and process pollock in the offshore fleet.[478] The percentage shares of the direct pollock fishery and PCC shares indicate that American Seafoods Company controls 16% of the pollock TAC and Trident Seafoods controls 6.5% of the TAC, accounting for nearly two-thirds of the PCC.

[479] NMFS 2001 Draft PSEIS Vol. VII, p. 2-124.

[480] Marine Conservation Alliance. Comments on Draft Biological Opinion for 2002 Steller sea lion Protection Measures, September 21,2001: p. 17.

[481] Marine Conservation Alliance. Comments on Draft Biological Opinion for 2002 Steller sea lion Protection Measures, September 21,2001: Figs. 1-3.

[482]NMFS 2001 Draft PSEIS, Sec. 4.2, p. 16; Fig. 4.2-5.

[483] NMFS 2001 Draft PSEIS Fig. 4.2-14.

reduction in catches of pollock from within sea lion critical habitat, which are expected to rise to formerly high levels of the 1990s under the 2002 Steller sea lion protection measures approved by the North Pacific Council and NMFS.

Under the AFA cooperative arrangement, there are more incentives to slow the race for fish, reduce waste, and reduce overall capacity to levels. However, the drain on staff time and resources at the Council management level required to implement the AFA rules has been enormous, the results of the AFA are mixed, and the ultimate impacts on the operation of the fishery uncertain:

"How the AFA will change the nature of the pollock fisheries is still somewhat uncertain. Under cooperatives there should be more incentives to slow the race for fish and there may be more consolidation of the harvest to fewer vessels. The ability to move away from areas of high bycatch or small pollock should also help rationalize the fishery."[484]

Ultimately, the AFA's ability to reduce significantly excess catching and processing capacity and address the problems identified in the early 1990s by the North Pacific seems questionable at best. The "sustainability" of this arrangement depends on continued high allowable catch levels and substantial fishing on roe-bearing fish during the spawning period in order to make all the participants profitable in the short-term.

2.1 The biggest, most efficient factory trawlers remain in the fishery under the AFA.

Under the terms of the 1998 American Fisheries Act, the offshore factory trawl fleet controls 40% of the Bering Sea directed pollock fishery. The numbers of pollock factory trawlers have declined through the 1990s, with the largest declines in smaller, less efficient fillet factory trawlers (from twelve in 1998 to four in 1999) resulting from retirement of nine factory trawlers under the provisions of the 1998 American Fisheries Act. In 1999, sixteen factory trawlers fished for pollock, twelve of them in the largest class of surimi vessels, down from forty-one in 1992-1993.[485,486]

The number of surimi factory trawlers has decreased about 40% from 1992, from twenty vessels to twelve in 1999.[487] This vessel class is extremely dependent on pollock, accounting for almost 95% of the total volume processed in 1999.[488] Production in 1999 was less than half of 1991, largely because allocations to the factory trawl fleet have been reduced over the 1990s. Surimi factory trawlers are the largest vessel class in the North Pacific groundfish fishery, ranging in size from 224-386 feet length overall, averaging 295 feet.[489] This vessel class has an average rating of more than 500 gross tons and more than 6,200 horsepower. They are capable of catching 400 metric tons or more of fish per day and producing 100 tons or more of frozen surimi or fillets per day.[490] Average daily production capacity for larger vessels is 50-80 metric tons, with freezer hold capacities of about

[484] NMFS 2001 Draft PSEIS, Sec. 2.7, p. 129.
[485] NMFS 2001 Draft PSEIS Vol. VII, p. 2-125, Figure 2.2-1, Table 2.2-4.
[486] NMFS 2001 Draft PSEIS Vol. VII, p. 2-133, Figure 2.2-5, Table 2.2-14.
[487] NMFS 2001 Draft PSEIS Vol. VII, p. 2-125, Figure 2.2-1, Table 2.2-4.
[488] NMFS 2001 Draft PSEIS Vol. VII, p. 2-126.
[489] NMFS 2001 Draft PSEIS Vol. VII, p. 2-124.
[490] NMFS 2001 Draft PSEIS Vol. VII, p. 2-124.

1,500 metric tons. Smaller surimi factory trawlers have maximum daily production capacity of about 50 tons of product and freezer hold capacities of about 500 tons.[491]

The number of fillet factory trawlers has decreased from twenty-one vessels in 1993 to only four in 1999, all owned by Washington State residents.[492] Fillet factory trawlers range in size from 210-296 feet length overall, averaging 240 feet.[493] This vessel class has an average rating of 460 gross tons and almost 4,200 horsepower. Like surimi factory trawlers, this vessel class is equipped with full processing deck below the main deck and a lower deck of freezer holds. The primary products of fillet factory trawlers are skinless and boneless pollock fillets, although Pacific cod is an important secondary target. Because they lack surimi production capabilities, fillet factory trawlers generally target larger fish that tend toward bottom, increasing bycatch rates for this vessel class.[494] Catching and production capability for fillet factory trawlers is not available from the 2001 North Pacific Groundfish Draft PSEIS.

2.2 The AFA does not address trawl catcher vessel capacity.

Of the 1,184 catcher vessels reporting groundfish catches >70 tons in 1998, only 203 were trawlers.[495] The AFA-qualified trawl catcher vessel fleet is comprised of 103 vessels, representing nearly 9% of the total number of the groundfish catcher vessels participating in the groundfish fishery in 1998[496] and accounting for 90% of the retained pollock catch by catcher vessels in 1998 (556,800 metric tons).[497,498] Vessels in this class that made landings of pollock increased sharply during the transition from the joint venture fishery in the late 1980s to the domestic fishery of the 1990s, and their numbers are not reduced by the AFA.[499]

Vessels in this class are extremely powerful and capable of towing large nets, averaging approximately 120' length overall with horsepower ratings of 1,300-1,700 hp.[500] Season lengths of the 1990s winter roe-pollock fishery ranged from 25-60 days for shored-based catcher boats and daily catch rates are now higher than for the factory trawl fleet, reflecting the fishing power of the modern catcher vessels. The relationship between shorebased processors and the catcher vessels that deliver to them vary widely from processing plant to processing plant:

> "All [Bering Sea shorebased processing plants] have standing relationships with their groundfish catcher vessels. Some processors have formal contracts of up to 5 years duration with the pollock vessels that deliver to them. Other [Bering Sea shorebased processing plants] have informal fishing agreements in which the plant agrees to sell only to that plant. [Others] have full or partial ownership interests in vessels that deliver to them – some are vertically integrated, with full ownership of all trawl vessels that deliver groundfish to them."[501]

[491] NMFS 2001 Draft PSEIS Vol. VII, p. 2-124.
[492] NMFS 2001 Draft PSEIS Vol. VII, p. 2-133, Figure 2.2-5, Table 2.2-14.
[493] NMFS 2001 Draft PSEIS Vol. VII, p. 2-132.
[494] NMFS 2001 Draft PSEIS Vol. VII, p. 2-133.
[495] NMFS 2001 Draft PSEIS Vol. VII, p. 2-9, Table 2.1-3.
[496] NMFS 2001 Draft PSEIS Vol. VII, p. 1-13, Table 1.1-2
[497] NMFS 2001 Draft PSEIS, Vol. VII, Appendix I, Table 2.1-5.
[498] NMFS 2001 Draft PSEIS Vol. VII, Appendix I, Table 2.1-13.
[499] NMFS 2001 Draft PSEIS Vol. VII, p. 2-11.
[500] NMFS 2001 Draft PSEIS Vol. VII, p. 2-11 and 2-26.
[501] NMFS 2001 Draft PSEIS Vol. VII, p. 1-175

The AFA did not include reductions in the numbers or catching capacity of this component of the pollock fleet in the Bering Sea.

AFA-qualified trawl catcher vessels with crab endorsements have an average length of 118 feet and most are less than 130 feet.[502] They have an average horsepower rating of about 1,300 hp, and larger vessels in this class can tow very large nets. Average hold capacity is 8,300 cubic feet.[503] Vessels in this class focus their effort in the BSAI from mid-January through April and from August through November, and some participate in the summer whiting fishery off Oregon and Washington. Vessels in this class that made groundfish landings increased from 26 in 1988 to 43 in 1998.[504] In 1998, 83% of the total ex-vessel value by this vessel class came from groundfish.[505] Pollock is easily the most important in terms of catch volume and ex-vessel value, followed by Pacific cod.[506]

AFA-qualified trawl catcher vessels without crab endorsements have similar characteristics as those with crab endorsements. Vessels in this class have an average length of 121 feet and an average horsepower rating of 1,700 hp, and are capable of towing very large nets.[507] Average hold capacity is 8,700 cubic feet and about 90% have refrigeration systems.[508] Vessels in this class that made groundfish landings increased sharply from 1988-1991 (21 to 60 vessels) during the transition from joint ventures to a domestic fishery. These vessels operate almost solely in the groundfish fishery for pollock and cod, fishing from mid-January through April and August through October. Many vessels in this class make at-sea deliveries to motherships.[509] In 1998, pollock accounted for 91% of catch by weight and 83.5% of total ex-vessel value.[510] Total catches have remained relatively stable during the 1990s, but ex-vessel revenues have fluctuated substantially owing to market conditions.[511]

The AFA does not address excess capacity and the race for fish in the Gulf of Alaska pollock fishery.

In the Gulf of Alaska pollock fishery, neither spatial dispersion outside sea lion critical habitat nor temporal dispersion outside the January to March winter season were achieved under the 1999-2000 pollock RPA. In fact, a higher proportion of the catch was concentrated in GOA critical habitat under the pollock RPA rules. Furthermore, pollock catches during the January to March winter period were more concentrated in 1999.[512] In the1999-2000 winter fishery, the TAC was taken in a shorter period of time and daily catch rates were higher, an outcome attributed to fleet size and excess capacity.[513] Despite a quarterly allocation of the

[502] NMFS 2001 Draft PSEIS Vol. VII, p. 2-11.
[503] NMFS 2001 Draft PSEIS Vol. VII, p. 2-11.
[504] NMFS 2001 Draft PSEIS Vol. VII, p. 2-11
[505] NMFS 2001 Draft PSEIS Vol. VII, p. 2-16, Figure 2.1-4.
[506] NMFS 2001 Draft PSEIS Vol. VII, p. 2-17, Table 2.1-7.
[507] NMFS 2001 Draft PSEIS Vol. VII, p. 2-26.
[508] NMFS 2001 Draft PSEIS Vol. VII, p. 2-26.
[509] NMFS 2001 Draft PSEIS Vol. VII, p. 2-31.
[510] NMFS 2001 Draft PSEIS Vol. VII, p. 2-31, Figure 2.1-17.
[511] NMFS 2001 Draft PSEIS Vol. VII, p. 2-31.
[512] NMFS 2001 Draft PSEIS, Sec. 4.2, pp. 19-20, Fig. 4.2-7
[513] NMFS 2001 Draft PSEIS, Sec. 4.2, p. 19 and Fig. 4.2-8.

pollock fishery, the November 2000 FMP BiOp analysis of weekly catch data for the years 1995-1999 indicates that the pollock, cod and other groundfish fisheries remain highly concentrated temporally in brief pulses.[514]

2.4 The AFA fails to address the impacts of technological changes on fishing power or to evaluate the impact of those changes on capacity

The number of fishing vessels in the pollock fishery is not a good proxy for fish-catching capacity. Vessel capacity is enhanced by changes in technological efficiency over time, so that a vessel constructed in the 1970's will have only a fraction of the fishing efficiency and potential capacity of a more recently built vessel of the same tonnage. In the North Pacific, changes in efficiency and fish-catching power of vessels have created profound problems affecting every aspect of conservation and management.

Neither NMFS nor the Council has analyzed the effects of technology development on catching and processing capacity, overcapitalization of the fisheries, and resulting impacts on catch rates, bycatch, length of fishing seasons, spatial patterns of fishing, preemption and equity of fishery benefits, or fish and wildlife habitats. The consequences of changing technology and efficiency improvements on the catching and processing of pollock must be considered, since the number of vessels and processing factories included the AFA agreement do not provide a good indication of total capacity in the fishery.

Fitzpatrick and Newton (1998) offer an analytical approach that can be applied to the North Pacific groundfish fleet in order to evaluate the impacts of technology and assess changes in fleet capacity over time.[515] Newton and Fitzpatrick establish a "technology coefficient" to quantify the difference in two similarly sized vessels produced at different points in time. The coefficients demonstrate how one modern vessel may have the equivalent fishing efficiency and potential capacity of several older similarly sized vessels. The coefficients also reflect the changes in efficiency as a vessel ages. The technology coefficients for several vessel types common to the Bering Sea and Gulf of Alaska groundfish fisheries are shown below:

Technology Coefficient by Vessel Types

Vessel Type	Vessel Length in m	Coefficient 1970	Coefficient 1980	Coefficient 1995
Super Trawler	120	0.6	1	2.5
Freezer Trawler	50	0.7	1	2.0
Stern Trawler	35	0.6	1	1.9
Longliner	35	0.4	1	2.8
Small Trawler	13	0.5	1	1.8

[514] NMFS November 2000 FMP BiOp, Fig. 6.15b.
[515] Fitzpatrick, John, and Chris Newton. 1998. Assessment of the World's Fishing Fleet, 1991 – 1997, prepared for Greenpeace International.

The year 1980 is the benchmark year, at a 1:1 ratio. Refinements of this table could be applied to specific fleets in the North Pacific by taking into account operational patterns and tactics. It can also be adapted to compare vessel categories, provided that there is an agreed classification of fishing vessels and fishing gear.

The technology coefficients reflect changes in technology over time, making a modern pollock fishing vessel much more efficient and powerful than vessels that operated in the foreign fishery of the 1960s-1980s. These include the following:

For vessels built in 1965 to 1975:

Refrigeration, hydrostatic transmissions, engine weight to power ratios, electronics, fishing gear developments, automation and safety radio communications.

For vessels built in 1976 to 1985:

Advanced sonar techniques, auto trawling, advanced single side band radio stations to INMARSAT communication systems, satellite positioning for vessels, on board machinery monitoring for fuel economy, developments in net twines.

For vessels built in 1986 to 1995:

Seabed profiling and echo sounder software, advanced auto-lining, prediction techniques using satellite imagery, on-board handling as a component of HACCP, side scan sonar, integrated wheelhouse designs remotely sensing trawl and purse-seine operations, high technology electronics, improved satellite data communication systems with application to vessel safety, precision vessel positioning systems (including low cost hand-held receivers).

In estimating the technology coefficients, the above elements are considered within the context of their application to fishing operations, such as cost reductions from improved fuel efficiencies; reducing the time involved in deployment and retrieval of fishing gear; improved ability of vessels to pin-point location so as to fish formerly difficult areas, etc. In terms of new construction, the application of technology coefficients can be viewed within the context of the increased importance of low-value high-volume species that began in the 1980's, compared with the importance of high valued demersal species in the 1970s. The shift to low-value species requires vessels to be cost-efficient particularly in terms of fuel consumption. Older vessels have higher fuel consumption because main and auxiliary machinery have poor specific fuel consumption to horse-power ratios, sub-optimum propeller design, poor insulating materials in fish holds requiring increased use of refrigeration compressors. These higher costs, together with reduced sea-time through breakdown, have to be offset, which increases the pressure to undermine conservation and management measures.

XII. NMFS MISMANAGEMENT OF THE GROUNDFISH FISHERIES, INCLUDING POLLOCK

The National Marine Fisheries Service (NMFS) has engaged in a pattern of management actions and inaction regarding the groundfish fisheries that violate the Endangered Species Act (ESA) and the National Environmental Policy Act (NEPA). Consequently, conservation organizations sued the agency, resulting in three federal district court decisions finding that NMFS violated federal environmental laws. The agency has been unsuccessful in its attempts to bring its management actions into compliance with the ESA and NEPA; a new complaint challenges the adequacy of two recent biological opinions and the groundfish fisheries are currently operating without a legally sufficient environmental impact statement. Below is a summary of the ongoing litigation to protect endangered Steller sea lions and the North Pacific ecosystem and to bring the agency into compliance with the ESA and NEPA.

1. Summary of the litigation regarding protection of Steller sea lions and the North Pacific Ecosystem

In April 1998, Earthjustice Legal Defense Fund and Trustees for Alaska sued the National Marine Fisheries Service (NMFS) on behalf of Greenpeace, American Oceans Campaign, and the Sierra Club in federal district court. Prior to the litigation, NMFS had authorized the massive groundfish fisheries in the North Pacific pursuant to very rudimentary Biological Opinions and Environmental Assessments (EAs) tiered off of Environmental Impact Statements (EISs) that were twenty years old. The Plaintiffs challenged the Biological Opinions under the Endangered Species Act, and the EAs and EISs under the National Environmental Policy Act.

In August 1998, the Plaintiffs filed a motion for summary judgment on these claims. Three days later, the government successfully sought a stay of the litigation, assuring the Court that it was preparing documents that would supersede those challenged by the Plaintiffs. In December, NMFS released two biological opinions and a Supplemental Environmental Impact Statement (SEIS). In BiOp1, NMFS addressed the effects of the pollock fisheries, standing alone, and the Atka mackerel fishery, standing alone on endangered Steller sea lions and their crititcal habitat. NMFS concluded that the pollock fisheries likely caused jeopardy to Steller sea lions and adverse modification to their critical habitat, but that the Atka mackerel fishery did not. In BiOp2, NMFS purported to examine the individual, combined and cumulative effects of all of the groundfish fisheries in the North Pacific. In the SEIS, NMFS examined alternative Total Allowable Catch levels. The Plaintiffs amended their complaint to include challenges to all three documents.

The parties briefed the adequacy of BiOp1 and the SEIS together. On July 8, 1999, the Court ruled that the jeopardy or adverse modification conclusions for the pollock fisheries were not arbitrary or capricious, that the Reasonable and Prudent Alternatives for the pollock fisheries were arbitrary and capricious, and that NEPA required NMFS to prepare a programmatic supplemental EIS. (*See Greenpeace, et al., v. NMFS,* 55 F. Supp. 2d 1248 (W.D. Wash. 1999). The Court remanded the documents to the agency. The parties then briefed the adequacy of BiOp2. On January 25, 2000, the Court ruled that the Endangered Species Act requires a biological opinion coextensive in scope with the agency action, that BiOp2 did not satisfy this mandate, that "meaningful analysis is virtually non-existent," and that "NMFS's analysis is admittedly incomplete and its conclusions inconclusive." (*See Greenpeace, et al., v. NMFS*, 80 F. Supp. 2d 1137 (W.D. Wash. 2000). The Court remanded the document to the agency.

On July 19, 2000, the Court granted the Plaintiffs' motion for a partial injunction, enjoining trawling in the federally-authorized groundfish fisheries from designated critical habitat for the western population of Steller sea lions. (*See Greenpeace et al., v. NMFS*, 106 F. Supp. 2d 1066 (W.D. Wash. 2000). The Court determined that the agency had failed to insure against likely jeopardy and adverse modification, and raised concerns about the "specter of a foregone conclusion" given NMFS' arguments against the injunction.

In early November 2000, language that would be attached as a rider to a congressional appropriations bill, preventing the release of the comprehensive FMP level Biological Opinion and waiving altogether the application of federal environmental laws to the North Pacific groundfish fisheries, also circulated, but did not become law.

On November 30, 2000, NMFS released a single, programmatic, comprehensive biological opinion (FMP BiOp) to satisfy the Court's remand of both BiOp1 and BiOp2. After the FMP BiOp's release, the Court dissolved the injunction. Prior to the release of the FMP BiOp, the industry mounted an effort to prevent its release. Documentation makes clear that the industry was in possession of at least one pre-decisional internal draft of the biological opinion and reasonable and prudent alternative (RPA), and that an industry delegation met with high-level NMFS officials to oppose the release of the biological opinion.

The FMP BiOp examined, for the first time, the combined and cumulative effects of all of the federal groundfish fisheries on endangered Steller sea lions and their critical habitat. NMFS concluded that the management of the Bering Sea/Aleutian Island and Gulf of Alaska groundfish fisheries under their respective Fishery Management Plans is likely to jeopardize endangered sea lions and adversely modify their critical habitat. "This competitive interaction, occurring at the global, regional, and local scales has been shown to jeopardize the continued existence of Steller sea lions by interfering with their foraging opportunities for the three major prey species resulting in reduced reproduction and survival."[516] NMFS emphasized that the effects on the sea lion prey base and habitat are likely to occur cumulatively over time as well as regionally and locally at shorter time scales,[517] and can effectively reduce the carrying capacity of critical habitat for sea lions.[518] The FMP BiOp identifies four primary effects categories: effect of global biomass levels, effects of disturbance, and effects of temporal and spatial concentration of fishing. [519]

Because the Endangered Species Act precludes federal agencies from authorizing any action that jeopardizes listed species or adversely modifies their critical habitat, the FMP BiOp included a mitigation plan for some of the groundfish fisheries to be able to operate without violating the ESA. This mitigation plan, known as a reasonable and prudent alternative (RPA), would have restricted the federal pollock, Atka mackerel, and Pacific cod fisheries "at all three scales (global, regional, and local) where the competitive interactions occur."[520] *In general, the RPA would have slowed the rate of fishing for these three species when the fish stock biomass falls below 40% of its unfished biomass,*

[516] NMFS November 2000 FMP Biop, p. 289.
[517] NMFS November 2000 FMP Biop, p. 271.
[518] NMFS November 2000 FMP Biop, p. 264-65.
[519] NMFS November 2000 FMP Biop, p. 259.
[520] NMFS November 2000 FMP Biop, p. 290.

separated the fisheries into four seasons in critical habitat and two seasons outside critical habitat, allocated a percentage of catch to each season, and closed roughly 66% of designated critical habitat to all fishing for pollock, Atka mackerel, and Pacific cod.

The FMP BiOp's RPA, however, was never implemented due to NMFS' interpretation of a rider successfully attached at the industry's urging by Alaska Senator Ted Stevens to the Consolidated Appropriations Act 2001 (P.L. 106-554) in December 2000. Because NMFS decided early in 2001 that it would prepare a new biological opinion, the parties did not litigate the adequacy of the FMP BiOp, instead reserving the right to pursue such claims at a later date, if appropriate.

The North Pacific Fishery Management Council hand-picked an "RPA Committee" to draft an alternative RPA to that provided in the FMP BiOp. The committee members representing conservation concerns were outvoted and the industry-dominated committee created a "protection" plan that largely repeals the temporal, spatial and catch limit provisions of previous pollock and Atka mackerel protection plans of 1999-2001. (*See* attached documents from Dave Cline of World Wildlife Fund and Gerry Leape of National Environmental Trust expressing disagreement over the committee's recommended plan).

In November 2001, NMFS released the new biological opinion wherein NMFS signed off on the RPA committee's plan. The new biological opinion evaluates a fishing plan proposed by the industry, and concludes that it is not likely to jeopardize sea lions or adversely modify their critical habitat. NMFS framed the new biological opinion as an action-specific BiOp. Thus, two biological opinions govern the conduct of the 2002 federal groundfish fisheries: the comprehensive Fishery Management Plan level biological opinion (FMP BiOp), and an action-specific biological opinion covering the fisheries for 2002 (BiOp 2002). Through June of 2002, the fisheries are operating under emergency interim rules that fail to adequately address jeopardy or adverse modification of critical habitat at the scale of competitive interaction, direct, indirect or cumulative over time.

IN FEBRUARY, THE PLAINTIFFS FILED A SUPPLEMENTAL COMPLAINT CHALLENGING BOTH OF THESE BIOLOGICAL OPINIONS. THE PLAINTIFFS CHALLENGED THE FAILURE OF BOTH THE FMP BIOP AND THE 2001 BIOP TO GRAPPLE WITH THE ADVERSE EFFECTS OF THE OVERALL FISHING RATE ON STELLER SEA LIONS, THEIR CRITICAL HABITAT, AND THE NORTH PACIFIC MARINE ECOSYSTEM. THE PLAINTIFFS FURTHER CHALLENGED THE NO JEOPARDY AND ADVERSE MODIFICATION CONCLUSIONS OF THE 2001 BIOP. THE PLAINTIFFS RECENTLY BRIEFED THESE ISSUES[521] AND THEIR CLAIMS WILL BE LITIGATED OVER THE SPRING AND SUMMER OF 2002.

On the National Environmental Policy Act front, NMFS released a Draft Programmatic Supplemental EIS (PSEIS) on the Alaska groundfish fisheries in response to the Court's 1999 remand order in January of 2001. The agency received over 20,000 comments on the draft PSEIS, from every state in the U.S. and from several foreign countries. The majority of these comments were critical of structural and substantive deficiencies in the Draft EIS. In particular, many of those who commented criticized NMFS' decision to frame alternatives around single resources instead of presenting integrated Fishery Management Plan alternatives pursuant to NEPA's mandates. In response to these public comments, in November 2001 NMFS decided to prepare a new draft PSEIS that includes more comprehensive, multiple-component alternatives and additional evaluation of environmental and cumulative impacts. The agency currently predicts that this new, revised draft EIS will be released for public comment in late 2002, and be finalized by December 2003. Until the EIS is finalized, NMFS is authorizing the groundfish fisheries in violation of NEPA.

[521] *See* Plaintiffs' Motion and Memorandum in Support of Motion for Summary Judgment, *Greenpeace, et al., v. NMFS*, April 24, 2002.

In sum, NMFS has a demonstrated history of violating the ESA and NEPA. Moreover, the agency is currently violating NEPA in authorizing the groundfish fisheries, including pollock, in the absence of a programmatic EIS; a pending lawsuit asserts that the agency continues to violate the ESA which will be decided this summer. Clearly the Council and NMFS have engaged in crisis management since the litigation to protect the western population of Steller sea lion and the North Pacific ecosystem began. Consequently, the management of the groundfish fisheries has been a state of severe flux, with no stable management system in place.

XIII. CONCLUSION

The Marine Stewardship Council should not certify the Alaska pollock fisheries as sustainable. These controversial fisheries are the subject of protracted litigation wherein most significantly, the federal district court has found the National Marine Fisheries Service in violation of the Endangered Species Act and the National Environmental Policy Act regarding its management of the groundfish fisheries and specifically the pollock fisheries. In addition, NMFS is conducting a programmatic review of the environmental impacts of the groundfish fisheries, of which pollock is the largest and most significant component that will not be complete until December 2003. Thus, it is premature to consider the pollock fisheries for certification because of the pending litigation and environmental analysis.

Moreover, when the pollock fisheries are analyzed against the MSC Sustainability Standard, they should not be certified because the Alaska pollock stocks have been reduced to low stock sizes, have significant impacts on pollock predators and the North Pacific ecosystem as evidenced by NMFS's determination that the fishery is jeopardizing Steller sea lions and their habitat, and are managed by an agency that has been unable to comply with federal environmental laws. As discussed above, in no way are the Alaska pollock fisheries sustainable as conducted currently. Serious changes that reduce TAC levels to account for uncertainties and unknown information, that spread out the fisheries in space and time, and that ensure that overfishing is not occurring in both the single species and ecosystem contexts must occur before the Alaska pollock fisheries should even be considered for evaluation under the MSC sustainability principles and criteria. The National Marine Fisheries Service must comply with federal law and act proactively to ensure that the fisheries are not adversely affecting the North Pacific ecosystems, specifically regarding food webs, trophic relationships, and habitats.

The Alaska pollock fisheries not sustainable because they remove massive amounts of biomass of important prey species that jeopardize endangered species and they resist management actions to protect against their adverse impacts on the North Pacific ecosystem and protected species. If the MSC certifies the Alaska pollock fisheries as sustainable, it will discredit any notion that the MSC labeled product signals "the best environmental choice in seafood" and de-value existing sustainability certifications. We urge you to deny the request of the At-sea Processors Association to find the Alaska pollock fisheries sustainable under the MSC's sustainability standard.

APPENDIX 2 – WORLD WILDLIFE FUND SUBMISSION TO ASSESSMENT TEAM

April 23, 2002

Dr. Chet Chaffee
Scientific Certification Systems, Inc.
1939 Harrison Street
Suite 400
Oakland, CA 94612

Dear Dr. Chaffee,

I have enclosed a copy of World Wildlife Fund's comments on the Bering Sea and Gulf of Alaska walleye pollock fisheries for consideration by your certification team. WWF recognizes the MSC's important role as a vehicle for improving the environmental performance of world fisheries, and we thank you and SCS for leading this assessment.

We have focused our review on the issues that we think are most important in light of the scoring guidelines developed in this case. The report points out many strengths as well as shortcomings, and notes key areas in which these fisheries differ from one another.

As an organization committed to the conservation of biological diversity, WWF is most concerned with the evaluation of the ecosystem impacts of these fisheries under Principle 2 of the MSC's Principles and Criteria. As we discuss in our comments, WWF believes that important new information will emerge during the next year or so that the certification team should take into account in its appraisal. Specifically, the National Research Council's assessment of the relationship between these fisheries and threatened and endangered Steller sea lion populations, together with the completion by NMFS of a more thorough Programmatic Supplemental Environmental Impact Statement for Alaska's groundfish fisheries under the National Environmental Policy Act, including a more thorough analysis of the impacts of fishing gear on essential fish habitat designated under the Sustainable Fisheries Act, and comprehensive population surveys of northern fur seals that breed on the Probilof Islands will provide your team with information that is critical to a full and objective review. Until this information is available and can be considered by your team, we do not believe that these fisheries are ripe for certification.

Once again, thank you for the opportunity to participate in this important endeavor. We look forward to working with you and your team as this process moves forward.

Sincerely,

Scott Burns
Director, Marine Conservation Program

ISSUES TO BE CONSIDERED BY THE EVALUATION TEAM FOR THE BERING SEA AND GULF OF ALASKA WALLEYE POLLOCK FISHERY

AUTHORS

Brock Bernstein, PhD, President, National Fisheries Conservation Center

Heather Blough, independent consultant

Suzanne Iudicello, JD, Junkyard Dogfish Consulting

Graeme Parkes, PhD, President, MRAG Americas Inc.

REVIEWERS

David Freestone, JD

Susan Hanna, PhD, Department of Agricultural and Resource Economics, Oregon State University

Marc Mangel, PhD, Department of Environmental Studies, University of California, Santa Cruz

Victor R. Restrepo, PhD, International Commission for the Conservation of Atlantic Tunas

Andy Rosenberg, PhD, College of Life Sciences and Agriculture, University of New Hampshire

Michael Weber, independent consultant

April 2002

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1 EXECUTIVE SUMMARY

The fishery for walleye pollock, a member of the cod family, was the largest single species fishery in the world prior to 1992 in terms of the biomass of landed catch. Since that time, landings of this species have been exceeded only by those of the Peruvian anchoveta. Over 70 percent of the total catch is taken in the Northwest Pacific fishery (Okhotsk Sea, Sea of Japan and Western Bering Sea), which is fished mainly by Russia, Japan, Korea, and Poland. The remaining catch is taken in the Northeast Pacific (Eastern Bering Sea and Gulf of Alaska), more than 95 percent of which is landed by U.S. fishing fleets. About 86 percent of the U.S. catch is taken from the Eastern Bering Sea; the remainder, from the Gulf of Alaska.

The Eastern Bering Sea and Gulf of Alaska pollock fishery is the largest fishery by volume in the United States, landing approximately 2,000,000 mt of pollock per year. This species comprises more than one-half of the entire volume of groundfish landed, and about two-thirds of the value of the groundfish fishery. A portion of the quota is reserved for the purpose of helping Alaska coastal communities to develop commercial fishing capacity.

Garnering about $700,000,000 per year after primary processing, pollock is the single most valuable species for processors, representing nearly one-half of the total wholesale value of fish from Alaska. Pollock products include fillets that are used for fish and chips, fish sandwiches, and frozen fish items, surimi (minced fish that is used in the manufacture of imitation crab and similar products), and roe. Fish meal is produced as a secondary product, as a result of a mandate for full utilization of pollock, and is exported. The United States and Europe are the primary market for fillets. Japan is the principal export target for surimi and roe.

The North Pacific Fishery Management Council manages U.S. pollock as smaller components of two larger “groundfish” complexes under two separate fishery management plans: 1) the *Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish,* implemented in 1982; and 2) the *Fishery Management Plan for Groundfish of the Gulf of Alaska*, implemented in 1978. The National Marine Fisheries Service, under the U.S. Department of Commerce’s National Oceanic and Atmospheric Administration, provides regulatory oversight.

The groundfish complexes are composed of more than a dozen species of cod, rockfish, flounders, sole, and mackerel species, in addition to pollock. But pollock is the most abundant species within the Eastern Bering Sea, and the second most abundant groundfish stock in the Gulf of Alaska. The Bering Sea and Gulf of Alaska ecosystems also support many other commercially important species such as salmon, crab, halibut, herring, and dozens of fish and shellfish, which are managed under separate fishery management plans.

There has not been a comprehensive scientific inventory of biological diversity in either of these ecosystems. But it is well known that they are also inhabited by more than 400 species of forage fish and other non-target fish species, along with molluscs, crustaceans, corals, and other marine life, ranging from micro-algae along the ice pack edge, to resident walrus, and to migrating whales.

The Bering Sea supports vast populations of 50 species of seabirds. The Pribilof Islands are referred to as the "Galapagos of the North" because of the exceptional abundance of marine organisms they support, including an estimated 2,500,000 seabirds, and nearly 75 percent of the world's northern fur seal population, which congregates around the Islands during the four to six month breeding season. Valuable habitats along the coastal fringe, such as eelgrass beds, coastal lagoons, deltas, wetlands, and estuaries, support an abundance and diversity of waterfowl and shorebirds. And the ice pack creates habitat for many other marine mammals, including seals, polar bears, and walruses.

Pollock constitute an important food source for many of the fish, seabirds, and marine mammals, with which they co-occur. And some hypothesize that a decrease in the availability of pollock in habitat determined to be critical to the endangered Steller sea lion is at least partly responsible for the continued decline in the western population of that marine mammal. The role of the pollock fisheries in the Steller sea lion decline has become a subject of great controversy and is now under review by the National Research Council.

The request of fishery participants to certify the pollock fishery as sustainable by the Marine Stewardship Council's standards has been controversial in and of itself. Because World Wildlife Fund was a partner in the development of the Marine Stewardship Council and the idea of independent certification of sustainable fisheries, we are interested in seeing the certification process carried out as an objective, science-based evaluation of fishery management systems and fishery performance. The evaluators should have the best available information before them.

The expansion of the initial scope of the certification evaluation from the Eastern Bering Sea to include the Gulf of Alaska as well creates some challenges for the evaluation team. These two fisheries differ significantly in fishing fleets, in fishing methods, and in the characteristics of the ecosystems within which they take place. Changes in the management of these fisheries in response to ongoing litigation further complicates the evaluation, making it difficult to define the scope of the review and to evaluate the overall sustainability of the pollock fishery.

The management system will continue to change as new information and new requirements develop. Lawsuits challenging the system's compliance with the National Environmental Policy Act and the Endangered Species Act are not settled. In any case, the most important issue is whether the evaluation team is satisfied that the court's rulings will be implemented once they have been reached and that there is a system in place to ensure commitment to compliance, to mark breaches of the rules, and to rectify breaches should they occur.

Several ongoing processes, including expanded environmental impact analysis and the National Research Council review of the competing hypotheses about the effects of the pollock fishery on Steller sea lion habitat, are generating material valuable to the evaluation team's review. World Wildlife Fund believes the evaluation team cannot complete its work without considering the views of one of the most highly respected scientific bodies in the nation, particularly since it may provide some resolution on one of the most controversial aspects of the fishery. Until this information is available and can be considered, World Wildlife Fund believes the fishery is not ripe for certification.

The certification process has begun, and the pollock evaluation is underway. Thus, we have developed this document to assist the evaluation team in assessing the sustainability of the U.S. walleye pollock fishery. The document is not intended to serve as a parallel assessment of fishery performance as it relates to each of the Marine Stewardship Council's individual scoring criteria, but rather to:

- Examine whether the principles and criteria are appropriate to the Bering Sea and Gulf of Alaska ecosystems or whether they should be modified in some respects;
- Highlight core issues deserving the attention of the evaluation team;
- Describe critical knowledge gaps;
- Describe the management system's response to uncertainty and other challenges related to sustainability; and
- Identify areas where the management system may need improvement in order to meet the Marine Stewardship Council's sustainability criteria.

Marine Stewardship Council Principle 1 requires that "A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery." Scientists understand a great deal about the biology and life history of walleye pollock. Thus, in terms of the information needed for traditional, single species stock management, this fishery is relatively well positioned. The stock assessment is state-of-the-art. And the conservative exploitation strategy provides fishery managers flexibility to adapt to new information as it becomes available. As a result, this fishery management system has been effective in maintaining its target species at sustainable levels.

Marine Stewardship Council Principle 2 requires that "fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which fishery depends." Significant issues for the evaluation team to consider under this principle relate to what scientists and managers *do not know* about the structure, productivity, and function of the highly complex and variable Bering Sea and Gulf of Alaska ecosystems, and about the ecosystem impacts of removing such a large tonnage of biomass from the system. These knowledge gaps are important because they are directly related to the ability to understand, predict, and manage in response to environmental variability, to sustain the pollock fisheries over the long term, and to maintain the structure, productivity, function, and diversity of the ecosystems on which the fisheries depend.

Marine Stewardship Council Principle 3 requires that "the fishery is subject to an effective management system that respects local, national, and international laws and standards, and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable." The fishery operates under a management plan and regulations devised within the framework of the Magnuson-Stevens Fishery Conservation and Management Act, with its ten National Standards, the stakeholder process provided by the North Pacific Fishery Management Council, the procedural requirements of U.S. administrative law, and more than 30 years of conservation policy embodied in U.S. environmental law. These elements form the basis of a management system that fits within the global framework for fishery management and contains most of the elements called for as best practices.

Despite this framework, the system has not operated, or been implemented, entirely without challenge or controversy. Significant issues for the evaluation team to examine under Principle 3 relate to the degree of confidence in stock assessments, the availability, use, and integration of ecosystem information, the way the system deals with uncertainty, especially about ecosystem effects beyond the target species, and about fishery activity and management outside the U.S. Exclusive Economic Zone, and the vulnerability of the U.S. fishery management system to political and legal challenge.

This document captures these and other issues in a final summary of the ten main issues we believe are worthy of further examination by the evaluation team. These points summarize areas where management could be improved with additional information or analysis. We have not drawn conclusions or made specific recommendations on scoring, though it can be assumed that in areas where we have raised no concerns, it is our view that management meets the Marine Stewardship Council standard for that indicator.

The ten issues are:

1. Stock assessment modeling is state-of-the-art, but assessments could be improved with additional calculations predicting the probability of overfishing under current control rules.
2. Incomplete knowledge about the effects of fishing on population and ecosystem structure, and about the structure of Bering Sea pollock and fishing mortality in Russian waters, creates uncertainty about appropriate exploitation rates.
3. The observer system currently used in the Alaska pollock fishery is one of the best in the world. But improvements could be made in several areas.
4. Incomplete knowledge of environmental influences on stock dynamics and of the effects of fishing on ecosystem structure makes it difficult for managers to clearly distinguish the relative effects of natural and anthropogenic factors on stock dynamics and ecosystems, or to predict how changes in ocean climate will affect stocks and ecosystems in the future.
5. Bycatch reduction and monitoring programs are effective. But bycatch reporting could be improved.
6. Incomplete knowledge about the trophic relationships among pollock and other species in the Bering Sea and Gulf of Alaska ecosystems makes it difficult to determine management strategies that are optimal for preserving critical relationships.
7. Uncertainties regarding the impact of the pollock fishery on the protected Steller sea lion have made it difficult to implement regulatory measures that are certain to protect this listed species and that comply with U.S. environmental laws.
8. In setting objectives for the fishery, managers have not until recently incorporated ecosystem objectives that encompass species and habitats beyond the target stock.
9. Traditional fishery management approaches, along with constraints on resources and unclear guidance, have weakened compliance with administrative procedures and environmental

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protection laws other than the Magnuson-Stevens Fishery Conservation and Management Act.

10. The fishery management system responds to stakeholder concerns on an ad-hoc basis, rather than considering them in the context of the goals and values of all stakeholders over the long term.

We recommend that:

1. Managers consider the benefits of adding an additional step to Gulf of Alaska assessments that would calculate the probability that various catch scenarios would be capable of maintaining fishing mortality and spawning stock biomass within threshold levels. The length of these projections should be determined by fishery analysts, but, at minimum, should equal the life span of the fish.

2. The evaluation team and managers examine the effect on population structure of the concentration of pollock fishing in time and space. Changes in mean age have been relatively slight compared to interannual variation in mean age for walleye pollock in the Gulf of Alaska. The evaluation team should examine whether the age structure of the Bering Sea stock has changed in response to fishing pressure.

   More research is needed on the reproductive biology of pollock to improve understanding of the effects of fishing on reproductive capacity. And managers should pursue ongoing work with Russian scientists to define stock structure and to improve understanding of genetic variations of pollock throughout the Bering Sea.

3. The National Marine Fisheries Service develop a mechanism under which the agency has direct control over the coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage.

4. Researchers continue to focus on better understanding the effects of environmental variability on stock dynamics, and that they designate no fishing areas that can be used to study the effects of fishing on ecosystem structure and to evaluate the impact of conservation measures on marine ecosystems, particularly on the predators of pollock. We also recommend that managers incorporate new information derived from these studies into stock assessments and ecological analyses.

   Recognizing, however, that no amount of money or research will eliminate all uncertainty, the management system should move away from an emphasis on predicting the most likely outcome. Instead, fishery managers should make much more use of scenario planning and other well developed tools that aid in developing management strategies that are robust under several possible futures.

   Though the draft Programmatic Environmental Impact Statement defines alternative management approaches, those approaches are considered independently and do not incorporate the more fully developed planning methods used in business, the military, crisis planning, and policy analysis.

5. Managers consider summarizing and publishing incidental catch and discards data at the fishery, as well as single-species, level to help the public to better understand the impacts of individual fisheries on non-target species.

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6. The evaluation team consider current efforts to investigate concerns related to the impacts of the pollock fishery on the pelagic food web through multispecies and ecosystem modeling, and to incorporate in the Stock Assessment and Fishery Evaluation report's Ecosystem Considerations chapter a set of indicators of ecosystem status and trends that could eventually provide an early warning of adverse changes in the ecosystem.

7. The evaluation team keep abreast of research developments that provide improved understanding of the impact of the pollock fishery on the protected Steller sea lion, and that fishery managers adapt regulations to address new information as it becomes available.

   In addition, it would benefit the management system to be more "adaptive" and less "reactive." Providing scientists and managers greater flexibility to experiment and test different hypotheses could help to resolve current uncertainties. While the fishery management system has become more flexible and responsive to new information, the concept of actively and intentionally probing the system has, for the most part, been lost. In some cases, this may mean pursuing incidental take permits for scientific purposes, or using other tools in the Endangered Species Act to allow carefully controlled takes of protected species at risk in local situations (e.g., by fishing near some sea lion rookeries and not others). Where the knowledge payoff would be great, leading to better conservation and management of the ecosystem, ways should be found to carry out meaningful field experiments using the fishery.

8. The evaluation team examine plans and timetables for the new Programmatic Environmental Impact Statement, and inquire of managers and of the applicants how the performance of new conservation approaches will be evaluated. The team should also take into consideration the actions of managers over the past several years to protect forage species and habitat, and to reduce the take of non-target species.

   The evaluation team should also keep abreast of efforts to complete the Supplemental Environmental Impact Statement required to comply with legal mandates to designate essential fish habitat and to minimize the impacts of fishing on essential fish habitat. Managers should examine, under the framework that provides for the designation of habitat areas of particular concern, the potential for marine protected areas in the Bering Sea and Gulf of Alaska to conserve marine biodiversity.

9. The evaluation team find out when the National Marine Fisheries Service's report to Congress on actions underway to improve compliance with the National Environmental Policy Act and other laws will be released, and that it evaluate the adequacy of proposed improvements, and the timetable for implementing those improvements.

10. The evaluation team assess how the fishery management system as a whole builds in mechanisms to articulate the social, cultural, and economic values and goals of diverse fishery stakeholders, and to provide for flexibility to respond to large-scale ecological change.

2 INTRODUCTION

World Wildlife Fund (WWF) works in more than 100 countries to end destructive fishing practices, to curtail illegal trade in marine wildlife, to create marine protected areas, to curb subsidies that promote overfishing, and to promote independent certification of sustainable fisheries. Our Global 200—a list of the most outstanding ecoregions in the world—includes 43 marine habitats. Five of these, including the Bering Sea, are also included in a list of particularly outstanding, environmentally threatened priority regions where we will focus much of our conservation energy in the coming years.

Our Bering Sea Ecoregion Program began in 1998. Through this program, we work with organizations, governments, and communities on both sides of the Bering Sea to conserve Bering Sea marine and coastal ecosystems, to raise awareness about the ecoregion and the threats facing it, to build public support for Bering Sea conservation, to improve stewardship of Bering Sea resources, and to develop a comprehensive conservation strategy. The major threats to biodiversity in the Bering Sea identified by a WWF and Nature Conservancy workshop in 1999 are fishery mismanagement, global climate change, the introduction of alien species, and pollution. Activities of the program include promoting implementation of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA), particularly habitat protection and bycatch reduction, supporting and promoting efforts to improve law enforcement of fisheries regulations in Russia, facilitating community involvement in fisheries conservation, and working with communities to build support for marine protected areas.

In 1996, WWF formed a conservation partnership with Unilever, one of the world's largest fish processors, to create the Marine Stewardship Council (MSC), which became an independent organization in 1997. Not only are we interested in seeing the certification process carried out as an objective, science-based evaluation of fishery management systems and fishery performance, we also are concerned that fishing is one of the most significant activities affecting biodiversity in the Bering Sea. As such, we want to be sure the evaluation team assembled by Scientific Certification Systems examines a number of issues of concern to our organization.

The attached report summarizes significant issues in the Eastern Bering Sea and Gulf of Alaska pollock fisheries. In some cases we have recommended areas where we believe the evaluation team should concentrate its inquiry and assessment. In others, we have made specific recommendations about how management could be improved.

There are a number of performance indicators where sectors of these fisheries are doing well at meeting the MSC Principles and Criteria. The report spends less time on these issues than on areas where questions remain, where uncertainty demands a more cautious response on behalf of the environment, or where improvement is called for. Although, in cases where we believe improvements can be made, we have offered recommendations.

We have not drawn conclusions or made specific recommendations on scoring, though it can be assumed that in areas where we have raised no concerns, it is our view that management meets the MSC standard for that indicator.

The report is organized in three main sections: 1) background and overview, 2) issues and analysis, and 3) conclusions and recommendations.

- The background and overview section provides a detailed description of the fisheries, their history, management, and the ecosystems in which they occur. The material provided in this section is drawn from government, industry, and non-governmental organization documents, published scientific reports, interviews, and the fishery management and policy literature. It is intended to provide the basis for our discussion in the issues and analysis section.
- The issues and analysis section identifies issues for the evaluation team's consideration under the MSC Principles and Criteria. We have organized the issues and analysis according to the three MSC Principles, and have identified the issues by the criteria and sub-criteria published by Scientific Certification Systems for the pollock fishery evaluation.
- Finally, the conclusions and recommendations section summarizes the ten main issues we believe are worthy of further examination by the evaluation team, and provides recommendations for improvements in management, research, or fishery operations that could help address these issues. Each numbered issue is followed by a description of the problem, the specific performance indicator(s) under which the issues arise, and how the point relates to a fishery's performance for the specified indicator. The information supporting each point is referenced to the relevant issue subsection, with citations to data or other documentation in the background section.

The report was prepared pursuant to a contract with the National Fisheries Conservation Center. Principal authors were Dr. Brock B. Bernstein, president of the National Fisheries Conservation Center; Heather Blough, independent consultant; Suzanne Iudicello, Junkyard Dogfish Consulting; and Dr. Graeme Parks, president of MRAG Americas Inc.

The report was reviewed by David Freestone; Dr. Susan Hanna, Department of Agricultural and Resource Economics, Oregon State University; Dr. Marc Mangel, Department of Environmental Studies, University of California, Santa Cruz; Dr. Victor Restrepo, International Commission for the Conservation of Atlantic Tunas; Dr. Andy Rosenberg, College of Life Sciences and Agriculture, University of New Hampshire; and Mike Weber, independent consultant. Reviewers were acting in their personal capacity and the views expressed are theirs as individual professionals and do not necessarily reflect the views of their respective institutions or organizations.

2.1 Scope of evaluation

2.1.1 Goal of this document

The goal of this document is to assist the evaluation team in assessing the sustainability of the U.S. walleye pollock fishery. The document is not intended to serve as a parallel assessment of fishery performance as it relates to each of the MSC's individual scoring criteria, but rather to:

- Examine whether the MSC criteria are appropriate to the Bering Sea and Gulf of Alaska ecosystems or whether they should be modified in some respects. (See comments to Scott Burns and Chet Chaffee, November 2001 (Appendix A));

- Highlight core issues deserving the attention of the evaluation team;
- Describe critical knowledge gaps;
- Describe the management system's response to uncertainty and other challenges related to sustainability; and
- Identify areas where the management system may need improvement in order to meet the MSC's sustainability criteria.

2.1.2 Spatial scope

We originally confined the scope of our comments to the Eastern Bering Sea pollock fishery to mirror the focus of the evaluation team's initial effort. But we later expanded our comments to cover the Gulf of Alaska fishery as well, in response to a similar expansion in the focus of the evaluation team.

While the management regimes regulating fishing in the Eastern Bering Sea and Gulf of Alaska are the same in many respects, the fishing vessels operating in these two management areas differ in number and type, in the gear they employ, and in the areas they fish. Most importantly, the pollock stocks fished in these two management areas are considered to be separate, and the broader ecosystems that support those stocks have distinct characteristics, particularly in regard to critical habitat for Steller sea lions.

Although the fishery under evaluation is a domestic U.S. fishery, straddling stock and transboundary stock issues must be recognized. Accordingly, this analysis touches upon management regimes, enforcement, and other issues in both international waters and the waters of the Russian Federation.

We recognize that management measures adopted by the State of Alaska for its coastal and marine systems also affect the federal pollock fishery, which occurs in waters between 3 and 200 miles from shore. For example, the State of Alaska manages fisheries for herring and other forage species and also exercises authority over land-based activities that affect water quality and nearshore habitat. These activities can affect essential fish habitat for pollock and forage species, as well as critical habitat for Steller sea lions and other protected species.

Because of time constraints, beyond recognizing this connection, we do not delve into state management issues. To the extent practicable, the evaluation team should take the opportunity to examine the interaction of the federal groundfish fishery with management practices adopted by the State of Alaska for its waters.

2.1.3 Temporal scope

Changes in the management of Eastern Bering Sea and Gulf of Alaska pollock fisheries in response to ongoing litigation created difficulties in defining the scope of our comments and in evaluating the overall sustainability of the fishery as a whole. The management system will undoubtedly continue to change, at least until the lawsuits challenging the system's compliance with the National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) are concluded.

Thus, the most important issue is whether the evaluation team is satisfied that the court's rulings will be implemented once they have been reached, and that there is a system in place to ensure commitment to compliance, to mark breaches of the rules, and to rectify breaches should they occur. Litigation in the U.S. courts can be seen as an indication of the commitment of stakeholders to ensure that managers meet regulatory and legal requirements. Litigious bystanders keep the system honest and require it to comply with the highest standards.

Several ongoing processes, including expanded environmental impact analysis and the National Research Council review of the competing hypotheses about the effects of the pollock fishery on Steller sea lion habitat, are generating material valuable to the evaluation team's review. WWF believes the evaluation team cannot complete its work without considering the views of one of the most highly respected scientific bodies in the nation, particularly since it may provide some resolution on one of the most controversial aspects of the fishery.

2.2 Establishing context

2.2.1 Definitions

Throughout this document, we use several terms that are either open to interpretation, that have definitions within the fishery management literature, or that are taken from law or regulation. In order to avoid any confusion over the intended meaning, we provide the following list of definitions:

Ecosystem management: We use the term "ecosystem management" to mean "ecosystem- based approaches to fishery management." The Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem in October 2001 explored numerous ideas for developing ecosystem- based approaches to fishery management as part of the implementation of the global Code of Conduct for Responsible Fisheries, negotiated in 1995 with the support of the United Nations Food and Agriculture Organization (U.N. FAO).[1]

The National Marine Fisheries Service (NMFS) is also developing guidelines for ecosystem- based approaches. In its 1999 report to Congress, the Ecosystem Principles Advisory Panel established by the agency stated that an ecosystem-based management approach would require managers "to consider all interactions that a target fish stock has with predators, competitors, and prey species; the effects of weather and climate on fisheries biology and ecology; the complex interactions between fishes and their habitat; and the effects of fishing on fish stocks and their habitat" (NMFS 1999).

Maximum sustainable yield: We assume the definition of maximum sustainable yield adopted by the NMFS in regulations dated August 4, 1997, which is "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions" (62 FR 41913).

[1] FAO of the United Nations. 1995. Code of Conduct for Responsible Fisheries. Adopted 31 October 1995. Rome.

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Overfishing: The terms “overfishing,” “overfished,” and “approaching an overfished condition” are taken from the M-SFCMA, implementing regulations, and the specific definition for pollock overfishing in North Pacific groundfish fishery management plans.

The statute defines “overfishing” and “overfished” as “a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis” (16 U.S.C. 1802(29)).

Federal regulations define “to overfish” as fishing “at a rate or level that jeopardizes the capacity of a stock or stock complex to produce maximum sustainable yield on a continuing basis,” and “overfished” to describe “any stock or stock complex for which a change in management practices is required in order to achieve an appropriate level and rate of rebuilding” (62 FR 41909).

Section 3.3.4 provides a detailed explanation of the definition of overfishing used in managing North Pacific groundfish fisheries.

Precautionary approach: The global Code of Conduct for Responsible Fisheries calls for a precautionary approach to fishery management. According to Article 7.5.1 of the Code, when the best available scientific information is uncertain, unreliable, or otherwise inadequate, managers should proceed in a risk-averse manner. And the absence of adequate scientific information should not be used as a reason for postponing or for failing to take conservation and management measures.

Sustainability: We use the terms “sustainability” or “sustainable” in the context of the MSC standard for “sustainable fisheries.” The MSC’s Principles and Criteria for Sustainable Fishing state that a sustainable fishery should be based upon:

- The maintenance and re-establishment of healthy populations of targeted species;
- The maintenance of the integrity of ecosystems;
- The development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental, and commercial aspects; and
- Compliance with relevant local and national laws and standards, and with international understandings and agreements.

The Principles state further that a sustainable fishery can be continued indefinitely at a reasonable level, and that such a fishery maintains ecological health and abundance and biological diversity at all levels, minimizes adverse effects on habitat, is well-managed and operated responsibly, maintains present and future economic and social options and benefits, and is conducted in a socially and economically fair and responsible manner (MSC 1997). In this report, we interpret “sustainable” to mean a fishery that meets these standards and the particular scoring guideposts for the assessment of pollock that were published by the MSC in February and April 2002.

2.2.2 Recognizing responsible/affected parties

A separation in the roles and responsibilities of fishery participants and fishery managers presents the evaluation team and the regulated industry with an interesting dilemma. A private party triggered the certification request, yet most of the focus of the evaluation (e.g., government assessments, rules and actions) is not within the purview of the requesting party to affect. So, for example, even if the regulated industry is complying with all current rules and conducting its business within the four corners of the management regime, it will pay the price if the management regime or the way it is implemented fails to pass muster. It would benefit the regulated industry not only to ensure that fishery managers implement the adopted management regime, but also that the regime operates within the confines of the law, and that it meets the highest possible standard. The evaluation team should give consideration to actions taken by the regulated industry to support the implementation of regulatory actions and to advocate improvements in the system.

2.2.3 Setting standards

It is important to evaluate the sustainability of a fishery within the context of what is practically achievable as opposed to an unrealistic ideal. Fisheries, by nature, have unavoidable impacts on the species they target and the marine systems within which they take place. These impacts represent tradeoffs generally made in exchange for the benefits fisheries provide and, as such, are inconsistent with the maintenance of target species at peak abundance levels, or the support of ecosystems in a completely undisturbed state.

The MSC's Principles and Criteria recognize that some ecosystem impacts are unavoidable, but call on fishing operations to "allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends." The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem. In a nutshell, while the MSC Standard recognizes that fishing, like many other human activities, has some unavoidable ecosystem impacts, it should not be permitted to substantially undermine ecosystem structure and function, or to significantly jeopardize biological diversity.

Numerous national, bilateral, multilateral, and international agreements and policies provide a differing array of standards for fishery management across the globe. In an in-depth review of the global framework for fisheries management, Weber (1998) suggests that, among these, several fishery policies represent a significant departure from a more traditional focus on achieving maximum production and resolving competitive exploitation conflicts. In particular, complementary conservation standards provided by the global Code of Conduct for Responsible Fisheries and the 1995 U.N. Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (U.N. Straddling Stocks Agreement)[2] are recognized as having the greatest potential to conserve biological diversity and to promote sustainable fishing practices (Freestone 1998).

[2] United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, A/Conf.164/37, 8 September 1995.

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These policies focus not only on the sustainable use of fishery resources, but also on the conservation and protection of associated species, supporting ecosystems, and habitats. They call for applying a precautionary approach to fishery management, using the best scientific information in fishery decision making, implementing effective monitoring and enforcement programs, improving data collection and research, developing sub-regional, regional, and global cooperation, ensuring transparency in decision making, and employing peaceful dispute resolution strategies.

An evaluation of the sustainability of a fishery must consider the protections afforded by governing policies and regulations within the context of practical standards established by such conservation-oriented policies. Of course, there is always room for improvement. In cases where the evaluation team determines existing best practices to be inadequate, it can use the promise of the MSC label to encourage the fishery to do more, especially in areas such as conserving biological diversity. In addition, where the evaluation team process identifies approaches, strategies or actions that surpass current, accepted best management practices, it can use its certification not only as a retrospective assessment of what is, but also as a prospective, action- forcing mechanism to help create what ought to be.

The conservation community has an enormous stake in the success of the MSC. It is important to WWF that the MSC standards are applied in a manner that is even-handed and fair, and that the decisions of certifiers are based on the best available science. We strongly believe that the MSC certification process can be an important vehicle for strengthening the sustainability of world fisheries and for promoting a more vigorous effort to reduce their ecosystem impacts.

3 BACKGROUND AND OVERVIEW

The walleye pollock fishery was the largest single species fishery in the world prior to 1992 in terms of biomass of landed catch. Since that time, landings of this species have been exceeded only by those of the Peruvian anchoveta. Figure 1 depicts the total annual walleye pollock catch taken from the northeast and northwest Pacific from 1970 to 1999. Total landings peaked at just over 6,750,000 metric tons (mt) in 1986, but declined to below 5,000,000 mt by 1991, and ranged from 4,000,000 to 5,000,000 mt between 1992 and 1998, before further decreasing to about 3,400,000 mt in 1999 (Froese and Pauly 2001). It should be noted that during this period, beginning in 1982, the U.S. catch was constrained by management actions.

Figure 2 describes historical average catches and estimated biomass of walleye pollock by stock or major fishing areas. Over 70 percent of the total catch is taken in the Northwest Pacific fishery (Okhotsk Sea, Sea of Japan and Western Bering Sea), which is fished mainly by Russia, Japan, Korea, and Poland. The remaining catch is taken in the Northeast Pacific (Eastern Bering Sea and Gulf of Alaska), more than 95 percent of which is landed by U.S. fishing fleets.

About 86 percent of the U.S. catch is taken from the Bering Sea; the remainder, from the Gulf of Alaska. Table 1, Figure 3 and Table 2, Figure 4 provide data on U.S. historical catches in the

Eastern Bering Sea and Gulf of Alaska, respectively, relative to total biomass and pre-season catch specifications.

3.1 Historical development of the Northeast Pacific pollock fishery

The historical development of the Northeast Pacific pollock fishery is well documented. Catches from the Eastern Bering Sea shelf initiated by Japanese vessels in 1954 remained at a low level until 1963 when the development of surimi processing led to large-scale expansion. Catches increased rapidly in the latter part of that decade, peaking at 1,900,000 mt in 1972, before being reduced under international agreement with Japan and the Soviet Union amid concerns over falling catch per unit effort (Wespestad 1993).

Only two years after Browning's 1974 speculation that "It is distinctly possible that…foreign fleets will cut the pollack [sic] resource to the point where a healthy fishery will be unattainable [for Americans and Canadians] unless international agreement on permissible catch preserves the stocks" (Browning 1974), the U.S. Congress expanded federal authority over fisheries by establishing a Fishery Conservation Zone under the Fishery Conservation and Management Act (FCMA) of 1976.

This Fishery Conservation Zone (the predecessor to the U.S. Exclusive Economic Zone defined in 1983 by Presidential Proclamation) extended U.S. fishery jurisdiction from 12 to 200 miles offshore. The FCMA prohibited foreign fishing in the Fishery Conservation Zone unless explicitly authorized. And the U.S. government set to work developing policies to replace foreign fishing with American fleets.

U.S. law set a catch priority for domestic fishermen. Federal assistance programs provided capital to build up the existing fleet and to convert crab boats to groundfish trawlers. Money, tax breaks, and other incentives provided by the State of Alaska paved the way for the development of onshore processing. Domestic processors also were accorded a priority, and only the catch they could not handle was made available to foreign companies.

During the mid-1980s, when domestic processing capacity was insufficient to meet demand, U.S. catcher vessels delivered catch to foreign motherships in a collection of joint ventures (Northern Economics 2000). Meanwhile, the State of Alaska pushed to develop domestic processing capacity onshore, and Seattle-based companies tooled up to create a catcher-processor fleet. The pollock fleet was transformed from a completely foreign to a completely American enterprise in less than a decade (Figure 5) (Northern Economics 2000).

In the mid-1980s, foreign vessels displaced from U.S. waters began targeting concentrations of pollock in the Central Bering Sea (the Aleutian Basin, including the so-called "Donut Hole," an area of international waters in the Central Bering Sea that is surrounded by the exclusive economic zones of the United States and Russia (see Figure 7)). Donut Hole catches grew from 181,000 mt to more than 1,000,000 mt in the two years from 1984 to 1986 and, the following year, exceeded the landed catch from the entire Eastern Bering Sea. The high seas catch peaked at about 1,450,000 mt in 1989, before rapidly declining to less than 2,000 mt in 1993. Since that time only trace amounts of walleye pollock have been taken from this area, which is under an international moratorium.[3]

In 1991, the year by which the Eastern Bering Sea fishery was completely Americanized, the fleet consisted of about 115 catcher vessels delivering pollock to inshore processors, 42 vessels operating as catcher-processors that both trawl for and process pollock, and one vessel serving as both a mothership (floating processor) and a catcher-processor (Kinoshita *et al.* 1997 in Northern Economics 2000). Each sector was required to take its share of the 1,300,000 mt quota in 148 fishing days, broken into an "A" and "B" season to extend fishing throughout the year (Miller *et al.* 1994).

In 1992 fishery managers proposed and approved regulations that divided the total allowable catch quota among the inshore sector, the offshore sector, and Alaska coastal communities, which participated in the fishery through local development projects, known as the "CDQ" or Community Development Quota program. This program provided eligible communities an entry into the lucrative groundfish fisheries by allocating them 7.5 percent of the total allowable catch (16 U.S.C. 1855). The remaining catch was split 65/35 between the offshore and inshore sectors, respectively.

By 1993, the fleet was composed of four motherships, 39 catcher-processor vessels (some serving as both motherships and catcher-processors), and 117 catcher vessels delivering catches inshore or to motherships. Although the total allowable catch remained steady at 1,300,000 mt, fishing capacity was two to three times in excess of that which was needed to take the quota (Greenpeace 1996; Miller *et al.* 1994). The fishing season had been reduced to 112 days for the inshore fleet and to 85 days for the offshore fleet (Kinoshita *et al.* 1997 in Northern Economics 2000). This was the first full year under an allocation split of fish between the offshore and onshore sectors, which commentators say exacerbated the overcapacity problem in the offshore sector and gave temporary relief to shoreside processors.

Excess capacity had intensified competition in the fishery, increasing allocation controversy between the inshore and offshore sectors. The problem of overcapitalization was illustrated not only by the race for fish and the accompanying bitter allocation disputes, but also by several industry bankruptcies, and by the exit of vessels from the fishery. To make matters worse, the bankrupt vessels did not exit the fishery, but were sold at a fraction of their cost and returned to the fishery where their reduced debt load made them more competitive than the rest of the fleet. This led to further offshore bankruptcies, eight in all by the middle part of the decade (APA 1999; Miller *et al.* 1994).

The catcher-processor sector was advocating some form of rationalization scheme to reduce fishing effort and to stop the race for walleye pollock. As stated in a 1992 North Pacific Fishery Management Council document supporting the implementation of a comprehensive

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[3] In 1993, the United States, China, Korea, Russia, Japan, and Poland negotiated the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (Senate Treaty Doc. 103-27) to govern the catch and management of fish stocks migrating between international waters in the Bering Sea (the "Donut Hole") and adjacent waters under national jurisdictions (Buck 1994).

rationalization plan "...the council must address the competing and oftentimes conflicting needs of the domestic fisheries that have developed rapidly under open access, fisheries which have become overcapitalized and mismatched to the finite fishery resources available" (Northern Economics 2000). The problems associated with overcapitalization enumerated by the Council ranged from gear conflicts to bycatch and waste, economic instability, disproportionate impacts on coastal communities, threats to marine mammals, and enforcement difficulties.

Conflicts over initial allocations and other issues thwarted the North Pacific Council's approval of a proposed quota regime. But in 1995, when the Council revisited the inshore/offshore split, it agreed to a license limitation program, to reauthorizing the existing 65-35 percent division of the catch between offshore and inshore processors, and to a dedicated effort to examine an individual fishing quota program for pollock (Hartley 2000). The license limitation program reduced the number of vessels allowed to participate in Alaska groundfish fisheries and prevented new vessels from entering the Bering Sea pollock fishery (Northern Economics 2000). But a 1996 Congressional action prohibiting the development of individual fishing quota programs for four years obviated any chance to proceed with the comprehensive rationalization plan as conceived (Iudicello 2000). That moratorium has since been extended through October 2002.

Despite the removal of fishing power through fleet consolidation and additional bankruptcies, the walleye pollock fishery had been reduced to just a three-month season by 1998 (APA 1999). That year the pollock industry developed a plan for a fishing cooperative, similar to one that had proved successful in the whiting fishery off the U.S. Pacific Coast. Supporters of the plan were hopeful that the cooperative would stop further investments in fishing capacity and help to better match fishing effort to the total allowable catch. Industry representatives took the plan to the U.S. Congress, after trying unsuccessfully to bring the idea before the North Pacific Council. And legislative action in the form of the American Fisheries Act (AFA)[4] facilitated the formation of cooperatives in the Bering Sea fishery. The first cooperative formed and operated in the 1999 fishing season (APA 1999).

Although cooperative members were pleased with the outcome, not all those who were part of the multi-sector, legislated allocation were certain they would realize promised benefits. And those who were not part of the deal that was negotiated in Congress liked it even less. According to some commentators, the AFA "created a closed class of fishing and processing companies" that have shut out Alaska's smaller trawlers. "Such schemes are intended to slow or halt the race for fish and reduce fishing capacity, but they have also left many of Alaska's smallest and most economically vulnerable communities with diminished and declining access to a traditional fishery resource" (Stump and Kline 2000).

Proponents of the AFA point out that conservation group advocates, Alaska Native representatives, non-pollock groundfish fishers, crabbers, representatives of small boat fishers, and coastal community officials and representatives were part of the negotiations (NPFMC 2002a). Moreover, they say that remote, Alaskan coastal communities with few sources or opportunities for economic development now have assets in a multi-million dollar

[4] In 105 Pub. L. 277, Omnibus Consolidated and Emergency Supplemental Appropriations Bill for Fiscal Year 1999.

fishing industry through their participation in the CDQ program created by the North Pacific Council in 1992. These communities did not traditionally participate in offshore groundfishing, although they relied on the sea for both subsistence use of marine resources and nearshore commercial fishing.

Today, 65 communities participating in the CDQ program hold a catch allocation of crab, halibut, groundfish and prohibited species through six non-profit corporations. Their allocation in 2000 amounted to 180,000 mt of groundfish, and about 1,361 mt each of halibut and crab. Revenues earned (mostly from pollock) in 2000 were about $63,000,000. The program has enabled the communities to invest in vessels, processing, developing local fisheries, job training, and fishing related businesses.[5]

Criticism of the AFA resurfaced when the legislation was reauthorized in 2001 even though it was not scheduled to expire until 2004. Opponents argued that the Act was passed without benefit of public hearings, and that it granted exclusive rights to the resource without consideration of royalties or some other means to return value to the public for the exclusive grant. Industry officials say no significant changes resulted from the reauthorization process and that the AFA continues improvements that led to a slower-paced, less wasteful fishery. Having completed their third year, the co-ops have resulted in some reduction in excess capacity. Annual reports to the North Pacific Fishery Management Council show that only 14 to 16 pollock catcher/processor vessels now participate in the Bering Sea fishery.

3.2 Description of the fishery

3.2.1 The fish

A member of the cod family, the walleye pollock, *Theragra chalcogramma*, is also known as Alaska pollock, bigeye cod or Pacific tomcod. It is a different species than the Atlantic or European pollock, *Pollachius virens*.

3.2.1.1 Biology/life history

The walleye pollock is a small, streamlined fish, olive green to brown in color, with a silvery underside and large eyes. It generally grows to 1.5-2 pounds and can reach up to 3 feet in length (Love 1996). Strong year-classes persist in significant numbers until about age 12, but very few individuals live past 16 years of age. The oldest recorded pollock was age 31 (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998). Natural mortality is estimated at 25 percent per year (DiCosimo and Kimball 2001; Witherell 2000a).

Walleye pollock exhibit seasonal inshore/offshore movements associated with feeding and spawning, respectively (Love 1996). Peak spawning occurs in late February to early March in the Aleutian Basin, in mid-March in the southeastern Bering Sea and eastern Aleutian Islands regions, and in April and May north of the Pribilof Islands. In the Gulf of Alaska, peak spawning occurs in March, principally in Shelikof Strait, but also around the Shumagin Islands, the east

[5] See Alaska Department of Community and Economic Development at http://www.dced.state.ak.us/cbd/CDQ/ cdq.htm.

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side of Kodiak Island, and near Prince William Sound (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998).

Female pollock in the Eastern Bering Sea area produce between 60,000 and 400,000 eggs (Witherell 2000a). Newly mature females in the Gulf of Alaska produce from 140,000 to 300,000 eggs (DiCosimo and Kimball 2001). Eggs are pelagic and developmental periods vary from 14 to 25.5 days depending on water temperature (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998).

Eastern Bering Sea pollock mature at about 4 years of age (Witherell 2000a), those in the Gulf of Alaska, at 3-4 years of age (DiCosimo and Kimball 2001). Pollock fisheries operating in both of those management areas target mature fish. Catches of immature fish (ages 2 and 3) are usually low, but increase when strong year-classes occur (See Section 3.3.5.2.1). There is some evidence that juveniles may comprise a major portion of the Russian catch (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998).

Copepods and euphausiids are the primary food source of immature pollock. Adult pollock are generally piscivorous, feeding on forage species such as capelin and herring, as well as juvenile pollock. Research suggests that cannibalism can regulate year-class size in areas such as the Eastern Bering Sea, where juvenile pollock are an important part of the diet of adult pollock (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998).

3.2.1.2 Habitat

Pelagic eggs develop on the outer continental shelf (Eastern Bering Sea) and the continental shelf and upper slope (Gulf of Alaska), generally in waters of 100-200 meters depth, but also in waters from 200-400 meters depth over basin and lower slope areas in the Aleutian Islands and the Aleutian Basin, which are likely characterized by upwelling or gyres (NPFMC 1999c).

Pelagic larvae are distributed in epipelagic waters on the continental shelf and upper slope throughout the Eastern Bering Sea, eastern portions of the Aleutian Basin, Aleutian Islands, and Gulf of Alaska. Larval survival is enhanced in areas that contain large concentrations of copepods and small euphausiids. These occur along semi-permanent fronts in the Eastern Bering Sea, within ephemeral gyres, and possibly in association with jellyfish (NPFMC 1999c).

In the Eastern Bering Sea, age-one juvenile pollock are pelagic and demersal. Distribution is widespread and no benthic habitat preference has been documented. Age-one juveniles from strong year-classes are believed to concentrate on the inner shelf and further north on the shelf. Those from weak year classes appear to concentrate on the outer continental shelf. Age-two to - three pollock are primarily pelagic and most abundant on the outer and mid-shelf area northwest of the Pribilof Islands. In the Gulf of Alaska, juvenile pollock occur in pelagic waters along the inner, mid and outer continental shelf, and may be associated with fronts and the thermocline (NPFMC 1999c).

Adult pollock in the Eastern Bering Sea are pelagic over deep Aleutian basin waters. They are meso-pelagic and semi-demersal along the middle and outer continental shelf from the U.S. Russia Convention Line to Unimak Pass, and northeast along the Alaska Peninsula and throughout the Aleutian Islands. Few adults occur in waters less than 70 meters depth. In the Gulf of Alaska, adult pollock are pelagic, inhabiting waters from 70-200 meters along the outer continental shelf and basin. They are believed to be associated with fronts and upwelling (NPFMC 1999c). More detailed information on the distribution of walleye pollock is provided in the following section.

3.2.1.3 Stock structure and distribution

The complex of walleye pollock stocks in the North Pacific has the distinction of being the largest groundfish population in the world (FAO 1997). Its distribution extends northwestward from southern Oregon into the southern Chukchi Sea, and as far south as the southern Sea of Japan (Bakkala 1993) (Figure 6). In 1993, the North Pacific Fishery Management Council estimated that walleye pollock accounted for approximately 50 percent of the total biomass of groundfish in the Eastern Bering Sea, Aleutian Islands, and Bogoslof district (NPFMC 1993).

For the purposes of this report, we use the term “stock” to represent a fishery management unit, and the term “population” to represent a genetically distinct unit. A population may consist of one or more stocks. Where overfishing of one of several stocks may result in local depletion of the stock and declining catch, it does not necessarily mean the population is overfished.

A review by Bailey *et al*. (1999) pointed out conflicting results of genetic studies and the need for comprehensive studies of population and stock structure. Within the Northeast Pacific, Bailey *et al.* (1999) report that Wespestad (1996) identified five geographically distinct “stocks” or centers of fishing activity. These stocks, which are not necessarily genetically distinct, are summarized in Table 3. Existing studies suggest varying gene flow among regions, and patterns of geographic stock structure. Genetic differences appear among broad regions, but resolution to differentiate within regions is lacking.

Pollock distributional data from surveys performed in 1994 by the National Oceanic and Atmospheric Administration’s research vessel, *Miller Freeman*, indicate a contiguous distribution of pollock from Bristol Bay to south of Cape Navarin (Figure 7). Data from 1996 indicate a continuous distribution to the U.S.-Russia Convention Line (Pautzke 1997). Dawson (1994) speculated that pollock in the Russian portion of the northwestern Bering Sea might be part of the same population as those found in the Eastern Bering Sea, while those of the southwestern Bering Sea might represent a separate population. Wespestad (1996) also agrees that walleye pollock from inside the U.S. Exclusive Economic Zone migrate westward from the Eastern Bering Sea, across the Convention Line, and intermingle with Russian pollock stocks.

Wespestad (1996) believes that pollock drift from the southeastern Bering Sea along the continental shelf to the north Bering Sea. They stay in the northwestern Bering Sea until they mature, and then move into the southeastern Bering Sea where they fall under U.S. jurisdiction. He notes that potentially large catches and discarding of juvenile pollock in the Russian Exclusive Economic Zone may reduce Eastern Bering Sea stocks below levels that have supported historic catches. This could require U.S. managers to significantly reduce catches in U.S. waters. While some Russian scientists acknowledge an historical predominance of Eastern Bering Sea-origin pollock in the western Bering Sea, the current Russian opinion is that a recent oceanographic regime shift resulted in a small fraction (five percent) of Eastern Bering Sea pollock in the Navarin region (Ianelli *et al*. 2000).

Although the population structure within the Eastern Bering Sea is not well known (Ianelli *et al*. 2000), three stocks are defined for management purposes: 1) the Eastern Bering Sea stock, 2) the Aleutian Islands stock, and 3) the Bogoslof Island-Aleutian Basin stock (see Figure 7 for geographic reference points). The Eastern Bering Sea stock supports the vast majority of U.S. catches (Figure 2). The Aleutian Islands stock supports a minor fishery, with catch levels much lower than in other parts of the northeast Pacific (ranging between 1,000 and 82,000 mt from 1979 to 2000). Although this stock is defined separately for stock assessment and management purposes, doubts have been raised as to whether it constitutes a population that is separate from the main Eastern Bering Sea stock (Ianelli *et al.* 2000).

Large pollock catches (377,436 mt) from the Bogoslof Island area were first recorded in 1987.[6] Catches subsequently declined to less than 40,000 mt in 1989 before increasing to over 260,000 mt in 1991.[7] Catches from this area then fell to less than 1,000 mt in 1992, and have remained at this level ever since. The Parties to the Pollock Convention (NMFS 2000b) have agreed to a comprehensive research program for the Aleutian Basin that consists of a survey of the Bogoslof Region, the creation of an historical catch database, trial fishing for 2001, and planning for a cooperative vessel survey in 2002.

Gulf of Alaska pollock are managed as a single stock and single population, independent of Eastern Bering Sea and Aleutian Islands pollock (Dorn *et al*. 2000). Population separation of the Eastern Bering Sea and Gulf of Alaska pollock is supported by analysis of larval drift, allozyme frequencies, mtDNA variability, and microsatellite allele variability (Dorn *et al*. 2000).

One-way, density dependent movements of pollock have been postulated for the Aleutian Basin and the Gulf of Alaska. The Aleutian Basin population may receive periodic outflows of pollock from the Eastern Bering Sea. For example, only large, older (greater than four years old) fish occupy pelagic waters of the basin, whereas all ages are found on the shelf and Aleutian Islands areas. This apparent absence of juveniles in the Aleutian Basin led Bakkala (1993) to suggest that the pollock found there originate, or at least spend their early lives, in other areas, presumably one or more of the shelf areas surrounding the basin. Similarly, the Gulf of Alaska may have benefited from a movement of part of the large 1989-year class from the Eastern Bering Sea (see Bailey *et al.* 1999).

The Eastern Bering Sea and the Aleutian Islands stocks are believed to be at moderately high abundance levels (Ianelli *et al.* 2000). The Aleutian Basin stock was diminished greatly by exploitation in the international Donut Hole, and all fishing was stopped in that area in 1993 (FAO 1997). The Gulf of Alaska stock has been declining in recent years due to poor recruitment (Dorn *et al.* 2000). Table 4 summarizes current information on the characteristics of the four defined stocks.

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[6] Pollock from the Aleutian Basin are thought to spawn in this area.
[7] Wespestad (1993) indicates that the comparatively low catches in 1988 and 1989 may be a misrepresentation of true catches from the Bogoslof Island area, because reporting requirements in those years combined catches from this area and the Eastern Bering Sea.

Pollock are considered to form two stocks in the Russian Exclusive Economic Zone: 1) the western Bering Sea stock near the Gulf of Olyutorsky, and 2) a northern stock located along the Navarin shelf from 171 deg East to the U.S.-Russia Convention Line of 1867[8] (Figure 7). While earlier morphometric and physiologic analyses indicated different populations in the northwestern Bering Sea, more recent DNA analyses found no genetic differences at a population level (Stepanenko *et al*. 1999) for the Navarin area. This stock is believed to be a mixture of eastern and western Bering Sea pollock, with the former predominant (Ianelli *et al.* 2000).

The definition and extent of separation of pollock stocks and populations within the U.S. management area will be a major topic of interest for the evaluation team. Important issues related to stock structure are described in Section 4.1.1.1.

3.2.2 The fishing fleet

3.2.2.1 Vessels

Pollock fishing in the Eastern Bering Sea is conducted primarily by a U.S. fleet composed of three kinds of trawlers: 1) trawlers that also fish crab pots, 2) trawlers designed exclusively as such, and 3) catcher-processor trawl vessels. The first two types of vessels deliver either to motherships or to onshore processing plants. Although there have been some trawlers under 60 feet that take pollock in the Eastern Bering Sea, most vessels of that size concentrate on Pacific cod, other higher value species, and pollock in the Gulf of Alaska (Northern Economics 2000).

Many of the trawlers that also fish for crab are modified crab pot vessels. These steel hulled vessels range from 79 to 172 feet in length, and have a large deck, stern ramp, and a forward cabin. Vessels designed exclusively as trawlers run from 73 to 193 feet long, with an average gross tonnage of 245, and engine horsepower of 1700. They, too, are steel hulled, and configured similarly to the modified crab pot vessels. Both types of vessels have refrigerated seawater tanks in the hold to keep pollock for delivery to processing plants onshore.

Catcher vessels without a refrigerated seawater hold must deliver their catch to motherships because they are not able to keep pollock fresh long enough to make the trip to port. These vessels are crewed by four to five persons, including the skipper, who may be the owner (Northern Economics 2000). Figure 8 shows a schematic of a catcher-processor trawl vessel. The largest of these vessels are up to 375 feet long, and have a similar overall configuration as the other trawlers, but with onboard processing plants, cold storage facilities, and accommodations for 50 to 100 crew members, including a galley, lounges, and laundry facilities.[9]

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[8] Note there is some controversy remaining over the position of the Convention Line. On June 21 2001, the Fisheries Information Service web site www.fis.com reported that Russia was reconsidering the Russian-U.S. agreement on the division of the Bering Sea. According to the article, Russia intends to conduct more active negotiations with the United States to make changes to the agreement. Yevgeny Nazdratenko, head of the Russian State Fisheries Committee, believes that the agreement "clearly hurts the economic interests of Russia." In particular, the Russian economic zone is 180 miles long, while the United States zone is over 220 miles long. Nazdratenko apparently also noted that "this agreement has no legal force, as the Russian parliament has still not ratified the document."

[9] Correspondence to Suzanne Iudicello dated 10 March 1997.

3.2.2.2 Gear and operations

3.2.2.2.1 Trawl gear

The vast majority of landed pollock (91 percent in 1996) are captured with pelagic trawl gear (BSAI EFH Technical Team 1998). Pelagic trawl nets are symmetrical, cone-shaped nets that taper from the opening or "fishing circle" down to a cod end. The opening, which is flanked by "wings" or trawl doors to keep it open while towed, can be from 72 to 300 feet from the top to the bottom. Although net sizes vary depending on the length of the vessel, the circumference of the largest net opening used by both trawlers and catcher-processor trawl vessels is 1,800 feet. For comparison, this is about the same size as the opening of a coastal salmon purse seine (AFTA 1996).

The mesh at the open end of the trawl is large, to reduce drag, and then the mesh size declines to four to eight inches near the cod end. The cod end is a bag attached at the end of the cone where the catch collects as the net is drawn through the water. It is "unzipped" from the rest of the net after it is hauled up onto the stern deck. The size of the net used by an individual vessel is determined by the amount of horsepower available to haul it in (Northern Economics 2000).

Trawling operations involve locating dense schools of fish with sonar and other electronics, setting the net, towing anywhere from 30 minutes to several hours, hauling the net up the stern ramp with winches, detaching the cod end, emptying the catch into the hold, closing up the cod end, making any net repairs, and then setting and towing again. Electronics are used to monitor both the fish and the net's configuration and operation (Northern Economics 2000).

3.2.2.2.2 Fixed gear

Fixed gear vessels include longline and pot catcher vessels of different size classes (less than 32 feet long, 33 to 59 feet long, and longer than 59 feet), and target Pacific cod and flatfish as well as pollock in the Gulf of Alaska. Fixed gear vessels in the Gulf of Alaska are generally smaller than similar vessel types in the Bering Sea, but a number of them are larger than 59 feet in length. Sablefish is the principal target of longline catcher vessels in the Gulf of Alaska. The smaller fixed-gear classes participate in the groundfish fisheries to supplement participation in salmon, herring, and halibut fisheries (NMFS 2001a). These non-trawl sectors of the fleet combined account for about 30 percent of the total groundfish catch in the Gulf of Alaska, 25 to 50 percent of which is composed of pollock (NPFMC 1999a). These vessels deliver to processing plants on the Alaska Peninsula, the Aleutian Islands, and in Kodiak.

3.2.3 The ecosystem

A National Research Council panel identified four domains of the Bering Sea: 1) the continental shelf and slope, which are predominant in the northeastern segment, 2) the Aleutian Basin north of the Aleutian Islands chain and extending westward to the Kamchatka Peninsula, 3) the Aleutian Islands, and 4) the Gulf of Alaska. These ecological domains are traversed by both water and organisms, particularly more mobile species at higher trophic levels. The atmospheric systems that influence surface ocean conditions extend well beyond them as well. In addition, the

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distributions of animals within these domains change over time. As a result, the boundaries of these ecological domains "tend to be ill defined and changeable" (NRC 1996).

For the purposes of groundfish management, the NMFS and the North Pacific Fishery Management Council have defined two ecosystems: 1) the Eastern Bering Sea/Aleutian Islands ecosystem (including the portion of the Bering Sea in U.S. territorial waters), and 2) the Gulf of Alaska ecosystem.

While many important questions remain unresolved (see Section 4.2), there is nevertheless a great deal of information about the structure and functioning of both the Bering Sea and the Gulf of Alaska ecosystems. This information comes from an extremely wide variety of sources in state and federal agencies, academic research institutions, and commercial industry, and has fortunately been summarized and synthesized in four key documents:

- *The Bering Sea Ecosystem* (NRC 1996), a National Research Council report produced in 1996 and triggered by concerns about declines in some marine mammal and seabird populations;
- The Gulf Ecosystem Monitoring and Research Program's draft Program Document (GEM 2001), produced in August 2001 by the Exxon Valdez Oilspill Trustee Council;
- The *Draft Supplemental Environmental Impact Statement* (NMFS 2001a) on the groundfish fisheries of the North Pacific, produced by the NMFS in January 2001; and
- The *Draft Biological Opinion and Incidental Take Statement* produced by the NMFS in August 2001 (subsequently finalized in October 2001 as the 2002 Biological Opinion) (NMFS 2001d).

Each of these documents reflects a somewhat different purpose but, taken together, they provide the most comprehensive and readily accessible source of information on our current understanding of these two ecosystems. Much of the information contained within this section is summarized from these sources.

3.2.3.1 Physical oceanography

3.2.3.1.1 Bering Sea

The Bering Sea basin is characterized by a general counter clockwise flow that includes an intensified western boundary current, the Kamchatka Current, and a northwestward flowing eastern boundary current (Figure 9) (NMFS 2001a). Pacific water enters the Bering Sea through the major passes in the Aleutian Islands (Favorite *et al.* 1976), although the actual volumes of water involved in this exchange are uncertain (NRC 1996). Water eventually exits the Bering Sea northward through the Bering Strait, or westward and south along the Russian coast, entering the western North Pacific via the Kamchatka Strait.

Well-defined fronts separate the Eastern Bering Sea into four domains, separated approximately by the 50-meter, the 80- to 100-meter, and the 170-meter isobaths, with the 170-meter isobath positioned at the shelf break. These domains are related to water circulation over the continental shelf (NMFS 2001a; NRC 1996). A special feature of the Bering Sea is the pack ice that covers

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most of its eastern and northern continental shelf during winter and spring, extending more than 1,700 km at its farthest extent and covering much of the shelf (Figure 10) (NMFS 2001a; NRC 1996). Sea ice affects ocean–atmosphere interactions in many ways, and its effect on bottom temperatures influences the distributions of many species (NRC 1996).

3.2.3.1.2 Gulf of Alaska

The Gulf of Alaska, with land masses only to the east and north, is a much more open system than the Eastern Bering Sea/Aleutian Islands. As described in NRC (1996) and NMFS (2001a), the dominant circulation in the Gulf of Alaska is characterized by the counter clockwise flow of the Alaska Gyre (Figure 9) (NMFS 2001a). Northward flow along the British Columbia shelf break is relatively wide and unorganized, but becomes much more coherent as it bends westward at the apex of the Gulf. Large amounts of precipitation and runoff of fresh water in this region are an important feature of the ecosystem, with the Gulf of Alaska having been compared to an estuary (Tully and Barber 1960). Large seasonal variations in the wind-stress curl in the Gulf of Alaska affect the meanders of the Alaska Stream and nearshore eddies. The variations in these nearshore flows and eddies are responsible for much of the region's biological variability.

3.2.3.2 Regime shifts

A key feature of the Bering Sea/Aleutian Islands and Gulf of Alaska ecosystems is the presence of decadal scale and naturally occurring regime shifts in a wide range of oceanographic parameters such as sea level pressure, wind, sea surface temperature, ice, and ocean currents. Such physical features are primarily driven by the winter atmospheric circulation. Changes in the Aleutian low strongly affect the nature of the regime (NMFS 2001a). There is widespread acceptance among scientists working in this system that these physical changes are associated with equally extensive changes in the makeup of biological communities (see Section 3.2.3.5).

It appears that, at least since 1890, regimes in the North Pacific have cycled back and forth at an interval of two to three decades (Minobe 1997; NMFS 2001a), most likely due to an internal oscillation in the coupled atmosphere-ocean system. This suggests that the next climatic regime shift is most likely to occur between 2000 and 2007 (NMFS 2001a). It is now widely recognized that a regime shift took place in 1976/1977, as indicated by the sudden jump in a composite index of 40 environmental variables (Francis and Hare 1994; Hare and Mantua 2000a). In addition, Hare and Mantua (2000a) have documented a more recent regime shift in 1989, particularly in the Bering Sea, based on the behavior of time series data on 31 climatic and 69 biological indices.

These alternate ecosystem states are commonly referred to as "warm" and "cold" regimes, with the Bering Sea/Aleutian Islands and Gulf of Alaska typically moving in concert, with the exception that, since the mid 1980's, the Bering Sea/Aleutian Islands has been relatively somewhat cooler than the Gulf of Alaska (NRC 1996). While temperature records in the Gulf of Alaska do not indicate a clear regime shift, biological time series do, leading to controversy about the presence and nature of any regime shift in the Gulf of Alaska (NMFS 2001a).

3.2.3.3 Environmental influence on harvest

Hollowed *et al*. (2001) found two major time scales of climatic events that affect marine fisheries in the North Pacific: 1) El Niño-Southern Oscillation events, which occur on a two to seven year time schedule, and 2) the Pacific Decadal Oscillation, which occurs on a decadal scale. If Bering Sea pollock respond to large climatic events with predictable changes in production (especially recruitment), then abundance could fluctuate in a predictable way.

Hollowed *et al*. (2001) examined fishes from three large geographic areas for evidence of Pure Temporal Variability, that would indicate forcing on one of these two times scales. Bering Sea and Gulf of Alaska pollock recruitment demonstrated low autocorrelation, which suggests that runs of strong or weak year classes do not occur during the climatic events. Gulf of Alaska pollock showed increased abundance during El Niño North (warm) conditions. The North Pacific gadoid species did not appear to respond to the Pacific Decadal Oscillation.

Pacific Decadal Oscillations, or regime shifts, occurred in 1925, 1947, and 1977 (Mantua *et al*. 1997), and possibly again in 1989 (Hare and Mantua 2000b). Many dramatic physical and biological shifts co-occurred with these oscillations. Hare and Mantua (2000b) noted that data on salmon production collected prior to the mid-1970s is not relevant to modeling the dynamics of present-day salmon runs because of different production relationships since the 1977 regime shift, and that evaluation of optimal catch rates for the Pacific halibut fishery use regime shift models as one expression of the recruitment process. Hare and Mantua (2000b) noted increased production of Gulf of Alaska pollock following the 1977 regime shift, and lower production following the 1989 regime shift.

Most stock assessment does not explicitly take climate variability into account. Hare and Mantua (2000b) recommend adopting a more holistic view, including the incorporation of environmental forcing, to increase our understanding of fish population dynamics and to better optimize the tradeoffs between catch and sustainability.

As noted earlier, the recruitment forecast for the Gulf of Alaska pollock uses five sources, three physical and two biological (Dorn *et al*. 2000). These sources apparently do not fluctuate in a pattern consistent with either El Niño-Southern Oscillation events or Pacific Decadal Oscillations. No environmental predictors for recruitment have been found for the Eastern Bering Sea stock. But the Russian Party (2000b) noted that recruitment patterns showed a pattern of periodicity in the Far East pollock stocks, with low recruitment prior to 1975, increased recruitment from 1975 to 1989, and reduced recruitment since 1990. These periods correspond to shifts in the Pacific Decadal Oscillation.

In addition to possible environmentally induced changes to recruitment, environmental fluctuations could cause changes in pollock distribution. Bailey *et al*. (1999) suggest that adult pollock expand their range during increasing abundance and during warm periods. Pollock avoid low bottom temperatures, from zero to two degrees Celsius, which limits their northern distribution in cold years. Thus cold years would reduce the movement of Eastern Bering Sea pollock to Russian waters, if transboundary migration occurs. Conversely, if environmental conditions occurred that consistently pushed a higher than normal proportion of pollock from the

Eastern Bering Sea to the Russian zone, then fishing in the Russian zone could severely impact the Eastern Bering Sea component of the stock.

3.2.3.4 Primary and secondary productivity

Detailed information on the distribution and fluctuations of phytoplankton and zooplankton, and the influence of physical oceanography on these, is generally not available. But some broad patterns are clear, and there are developing conceptual models about these connections.

The physical zonation of the continental shelf in the Bering Sea strongly controls the amount and distribution of primary productivity. The major fronts inhibit cross-shelf movement of nutrients from the deeper basin onto the shelf and the consequent slow nutrient renewal in the coastal domain leads to relatively low total production there. Primary productivity is higher in the deeper and more offshore domains (NRC 1996). This physical zonation also affects secondary production, with a much larger biomass of zooplankton found over the outer domain and decreasing biomass over the middle and coastal domains (NRC 1996). As a consequence, there is a greater shunt of primary production to the pelagic food web in the outer domains.

Primary production can vary as much as 30 to 50 percent between years in the outer domains but is apparently relatively consistent in the coastal domain (NRC 1996). Not much is known about the system-wide impacts of regime shifts on primary and secondary productivity. But there is accumulating evidence of the potential for such impacts. Francis and Hare (1994) suggest that interannual fluctuations in zooplankton abundance on the northern Gulf of Alaska shelf are related to the strength of Aleutian Low wind field. Venrick *et al.* (1987) found a significant increase in water column chlorophyll concentrations north of Hawaii after the 1976/1977 regime shift. Brodeur *et al.* (1999) documented a tenfold increase in the biomass of large medusae in bottom trawls in the 1990s, following a change around 1990 in several large-scale, winter–spring atmospheric and oceanographic variables in the Bering Sea.

The Gulf Ecosystem Monitoring Program has developed a conceptual model of how changes in the strength of the Aleutian Low related to regime shifts could strongly influence both the strength and distribution of primary and secondary productivity in the Gulf of Alaska (GEM, 2001).

When the Aleutian Low is more intense (positive Pacific Decadal Oscillation), stronger winds lead to increased upwelling of nutrient rich water offshore and a shallower, more productive mixed layer. But this set of conditions also leads to greater precipitation and terrestrial runoff, which in turn creates greater stratification in the nearshore zone and inhibits upwelling of deeper, nutrient rich water. In this set of conditions, productivity is higher offshore, leading to increases in salmon populations, while lower productivity inshore leads to decreases in forage fish and the populations of seabirds and marine mammals that depend on them.

During regimes when the Aleutian Low is less intense (negative Pacific Decadal Oscillation), the reverse of these patterns occurs, with increased productivity inshore and improved conditions for seabirds and marine mammals, but decreased productivity and salmon populations offshore. Similarly, Francis and Hare (1994) found strong linkages between long-term patterns in the intensity of the Aleutian Low and salmon production.

3.2.3.5 Biological diversity

Pollock in the Eastern Bering Sea and Gulf of Alaska are managed together with more than a dozen species of cod, rockfish, flounders, sole and mackerel species, characterized as the "groundfish" complex (See Section 3.3.2). Pollock is the most abundant species within the Eastern Bering Sea, comprising 75-80 percent of the total catch and 60 percent of the biomass. Pollock is the second most abundant groundfish stock in the Gulf of Alaska, comprising 25-50 percent of the catch and 20 percent of the biomass (BSAI EFH Technical Team 1998).

The Bering Sea and Gulf of Alaska ecosystems also support many other commercially important species such as salmon, crab, halibut, herring, and dozens of fish and shellfish, which are managed under separate fishery management plans. There has not been a comprehensive scientific inventory of biological diversity in either of these ecosystems. But it is well known that they are also inhabited by more than 400 species of forage fish and other non-target fish species, along with molluscs, crustaceans, corals, and other marine life, ranging from micro-algae along the ice pack edge, to resident walrus, and to migrating whales (WWF 2002).

The 53-mile-wide Bering Strait that connects the Bering Sea to the Arctic Ocean is critical to marine life migrating to and from summering grounds in the Chukchi Sea and elsewhere in the Arctic Ocean. The Bering Sea supports vast populations of 50 species of seabirds, including nearly 10,000,000 murres and auklets. The Sea's Pribilof Islands, often referred to as the "Galapagos of the North" because of the exceptional abundance of marine organisms they support, are home to one of the world's largest seabird colonies, which is composed of an estimated 2,500,000 birds (WWF 2002). These Islands also support nearly 75 percent of the world's northern fur seal population during their four to six month breeding season (Angliss *et al.* 2001). The coastal fringe, including eelgrass beds, extensive coastal lagoons, deltas, wetlands and estuaries, supports an abundance and diversity of waterfowl and shorebirds (WWF/TNC 1999).

Among the 25 species of marine mammals that inhabit or migrate through the Bering Sea are the endangered bowhead, sperm, humpback, fin and northern right whales. The ice pack creates habitat for many other marine mammals, including seals, polar bears, and walruses, by providing a surface on which these animals can rest and bear their young in an isolated environment, with easy access to the food supply (WWF 2002). The region is home to ten strategic stocks[10] of marine mammals, including the northern fur seal and the Steller sea lion.

Pollock constitute an important food source for many of the fish, seabirds, and marine mammals, with which they co-occur. For example, the hatching success and fledgling survival of seabirds on the Pribilof Islands is believed to be associated with the availability of age-zero pollock to nesting birds (BSAI EFH Technical Team 1998; GOA EFH Technical Team 1998). And some hypothesize that a decrease in the availability of pollock in habitat determined to be critical to the

[10] Amendments to the Marine Mammal Protection Act in 1994 define "strategic stock" as a marine mammal stock that is listed or likely to be listed under the Endangered Species Act, designated as depleted under the MMPA, or suffers human-caused mortality at a level greater than is biologically sustainable. Definition as a strategic stock triggers more aggressive conservation measures under the Act (16 U.S.C. 1362(18)). Pub.L. 103-238 (1994).

Steller sea lion is at least partly responsible for the continued decline in the western population of that marine mammal.

The role of the pollock fisheries in the Steller sea lion decline has increasingly grown to be a subject of great controversy. Section 3.3.5 summarizes current information on the effects of fishing on Steller sea lions and other ecosystem inhabitants, as well as management measures taken to reduce fishing-related impacts on protected and non-target species.

3.3 Description of the fishery management regime

Management of the Eastern Bering Sea and Gulf of Alaska pollock fisheries, although exercised by the United States over domestic fisheries that take place within the U.S. Exclusive Economic Zone, nonetheless occurs in an international context. Not only are questions of the straddling nature of pollock stocks at issue in the Bering Sea and Gulf of Alaska. In addition, management of pollock fishing in the Donut Hole occurs under an international treaty. Finally, the United States is a party to the 1982 U.N. Convention on the Law of the Sea,[11] the U.N. Straddling Stocks Agreement, and the global Code of Conduct for Responsible Fisheries. As such, our nation observes the conventions and standards of these international agreements and has met its obligations thereunder by enacting national legislation and administrative action.

The U.S. fishery management system has been examined and analyzed thoroughly over its nearly 30-year history. Recent publications leading up to and assessing the most recent changes to and implementation of U.S. fishery management law include:

- *Sustaining Marine Fisheries* (NRC 1999);
- *Fishing Grounds: Defining A New Era for American Fisheries Management* (The Heinz Center 2000a); and
- *From Abundance to Scarcity: A History of U.S. Marine Fisheries Policy* (Weber 2001)

In addition, a variety of sources in state and federal agencies, academic research institutions, and the non-governmental community have focused on particular concerns and vulnerabilities in the system, from conflicts of interest, to ecosystem-based management approaches, to environmental compliance, to incentives and subsidies.

3.3.1 Governing authorities

3.3.1.1 International framework

Intensive pollock fishing in the area of international waters outside the exclusive economic zones of the United States and Russia gave rise to concern about the status of pollock stocks within the waters of the respective nations. Negotiations begun in 1991 led to the Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (the Pollock

[11] Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 ILM 1245.

Convention), concluded in June 1994 among China, South Korea, Poland, the Russian Federation, and the United States.[12]

The primary effect of the Pollock Convention was a moratorium on pollock fishing in the Donut Hole. But the Convention also contains management objectives, including restoration of pollock to levels that will produce maximum sustainable yield. Cooperation in data gathering is another principle aim, and there is a Scientific and Technical Committee that meets to exchange information and to set an allowable catch level. The convention has been described as oriented mainly to the allocation of fishing rights, rather than to conservation (Weber 1998).

The 1982 U.N. Convention on the Law of the Sea, which entered into force in November 1994, is the overarching body of law that covers every aspect of marine endeavor, from transportation, to pollution, to military issues, to scientific research. Its language related to protecting living marine resources sets out the rights and responsibilities of coastal states and flag states with regard to fishing. Article 56 of the Convention provides coastal states sovereign rights over resources out to 200 miles. Article 61 provides the authority to conserve and manage living resources within that jurisdiction.

Article 61(2) of the Convention requires that coastal nations ensure, using the best scientific information available and conservation and management measures, that the living resources of the exclusive economic zone are not threatened by overexploitation. Article 61(3) adopts maximum sustainable yield as the goal for maintaining or restoring exploited populations. Article 61(5) requires that coastal states collect, contribute, and exchange scientific information, catch, and effort statistics with other concerned states.

Article 62 of the Convention provides that foreign access to the zones of coastal states is solely within the discretion of those states, and subject to state laws and regulations, including requirements for licensing, observers, and other conservation measures. Compliance with conservation and management measures is required.

Article 63 of the Convention directs states to seek the coordinated measures necessary to conserve stocks that occur in waters adjacent to their zones, or within the zones of two or more coastal states. With regard to highly migratory species, Article 64 calls for cooperation through international organizations, and where none exists, for the establishment of such organizations "with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone."

The Convention even imposed new obligations on high seas fishing states. While freedom of fishing on the high seas continues in principle, the Convention can be read as imposing a dual responsibility on fishing nations - conservation and cooperation with coastal states (Sohn and Gustafson 1984).

The U.N. FAO, recognizing the need for further measures beyond those in the 1982 U.N. Convention on the Law of the Sea, "recommended the formulation of a global Code of Conduct for Responsible Fisheries which would...establish principles and standards applicable to the

[12] Senate Treaty Doc. 103-27.

conservation, management, and development of all fisheries."[13] The FAO Conference adopted the global Code of Conduct by unanimous vote on October 31, 1995. The Code covers both policy and technical matters in its 12 articles, including fishery management, fishing operations, aquaculture, coastal area development, research, and trade.

As described in Articles 1.1-1.3, the Code of Conduct is voluntary and non-binding, to be adopted by nations through national implementation and legislation. But some of its provisions are obligatory because of their relation to other legal instruments. The Code provides principles and standards for every aspect of fisheries, from aquaculture to capture, from research to fishing operations, and from processing to trade. And it is directed toward all persons concerned with conserving, managing, or developing fisheries, processing, or marketing, or any "users of the aquatic environment in relation to fisheries."

Article 6.1 of the Code of Conduct attaches, for the first time, an obligation to the freedom to fish, and calls for using living marine resources "in a responsible manner so as to ensure effective conservation and management." Article 6.2 discusses intergenerational equity in the fishery context for the first time as well, calling for maintaining the diversity of fishery resources for "present and future generations" as well as for "food security, poverty alleviation, and sustainable development."

Articles 6.3-6.8 of the Code of Conduct urge the use of effort controls, ecosystem management, the precautionary approach, selective fishing gear, habitat protection, and the best scientific information. Articles 6.10-6.12 and 6.15 call not only for monitoring and controlling flag state vessels, but also for cooperating at all levels and among jurisdictions, and for preventing disputes. Articles 6.13 and 6.16-6.18 urges states to adopt transparent decision making processes, as well as education and training programs, to provide safe and fair working conditions, and to recognize and protect the rights of subsistence, small-scale, and artisanal fishers (Weber 1998).

Articles 7-12 of the Code of Conduct provide specific guidance to states and interested parties on operational and technical matters. Many specific provisions provide further detail on the general principles set forth in the Code by describing how, for example, the precautionary approach would be applied in fishery management (see Section 4.3). A series of technical guidelines produced by the U.N. FAO provides further elaboration.

In both procedural and substantive recommendations, the global Code of Conduct is far ahead of traditional fishery agreements. Management objectives include maintaining or restoring stocks to levels that would produce the maximum sustainable yield, avoiding excess fishing capacity, protecting biodiversity and endangered species, assessing and mitigating adverse impacts from human activities, and minimizing pollution, waste, discards, ghost fishing, and bycatch. The Code recommends assessing whole ecosystems and ecological interrelationships, and directs states to consider whole stock units over their entire area of distribution.

The 1992 U.N. Conference on Environment and Development in Rio de Janeiro recognized that neither the Convention on the Law of the Sea nor the global Code of Conduct for Responsible Fisheries was slowing the depletion of fish stocks around the world. The problem of effectively

[13] FAO of the United Nations. 1995. Code of Conduct for Responsible Fisheries. Adopted 31 October 1995. Rome.

managing high seas stocks was a particular concern, resulting in a conference on straddling fish stocks and highly migratory fish stocks.

The subsequent U.N. Straddling Stocks Agreement has been recognized as the most significant outcome of the fishery management directives from Agenda 21, and a "sea change" in international fishery management. For the first time, the focus of an international fishing agreement shifted from producing maximum food for humans, to sustainable fishing, ecosystem protection, conservation of biological diversity, and the use of a precautionary approach to fishery management (Freestone 1998).

The U.N. Straddling Stocks Agreement is also the first international agreement to produce an actual methodology for the precautionary approach, and to establish reference points, targets, and limits. Most significantly, the Agreement denies (for party nations) unqualified access to fish on the high seas. It accomplishes all this without creating a new international structure, relying instead on existing regional agreements and organizations, and calling for mechanisms to strengthen them. Where such agreements or organizations do not exist, Article 8(5) directs states to create them.

Any state that ratifies the U.N. Agreement agrees to join, or to observe the conservation measures of, the relevant regional fisheries regime while fishing in the area under its jurisdiction. In a comprehensive evaluation of global fishery management regimes, Weber (1998) writes that "This provision, if observed and enforced, will address a critical problem common to fisheries regimes in all oceans: The undermining of conservation measures by the fishing activities of vessels from countries that do not belong to relevant regional regimes." Appendix B provides a detailed description of each of the elements of the U.N. Straddling Stocks Agreement.

3.3.1.2 National regime

The North Pacific Fishery Management Council manages the U.S. pollock fishery with oversight from the NMFS under the U.S. Department of Commerce. That regional fishery management council is one of eight established by the FCMA of 1976 to develop, through a participatory process, management measures for fisheries taking place within the U.S. Exclusive Economic Zone. While regional councils are responsible for developing fishery management measures, the Act vests final authority and responsibility for federal fishery management with the U.S. Secretary of Commerce. The Act also provides ten national standards to guide fishery management decision making.

While seven of the eight regional fishery management councils are responsible for federal fisheries off the coasts of multiple states, the North Pacific Council manages fisheries in federal waters only off the State of Alaska. In addition to the fishery agency of the State of Alaska, those of the states of Oregon and Washington have voting representation on the Council, along with the NMFS, and seven public members appointed by the U.S. Secretary of Commerce.

3.3.2 Fishery management plans and goals

The Gulf of Alaska and Bering Sea/Aleutian Islands walleye pollock fisheries are managed as smaller components of two larger "groundfish" complexes under two separate fishery management plans.

The *Fishery Management Plan for Groundfish of the Gulf of Alaska* was implemented on December 1, 1978 and has been amended over fifty times (DiCosimo 1998b). According to the NMFS' most recent report to Congress on the status of U.S. fisheries, 8 of the 95 stocks managed under this groundfish plan are neither overfished, nor approaching an overfished condition.[14] The status of the remaining 87 stocks is unknown (NMFS 2001f).

The *Fishery Management Plan for the Bering Sea/Aleutian Islands Groundfish* was implemented on January 1, 1982 (Witherell 1997) and has been amended over forty times (see Appendix C for details). The NMFS (2001f) reports that, of the 121 stocks managed by the North Pacific Council under this plan, 13 are neither overfished, nor approaching an overfished condition.[15] The status of the remaining 108 stocks is unknown.

The Gulf of Alaska plan identifies as "target species" walleye pollock, Pacific cod, flounders, sablefish, and numerous species of rockfish. Atka mackerel, squid, sculpins, sharks, skates, eulachon, capelin, smelts, and octopus are described as "other species" taken in the groundfish fishery that have less commercial importance. Catches of both "target" and "other species" are limited and documented. Catches of other "non-specified species," including grenadiers, eelpouts, sea urchins, and mussels, which are taken incidental to the groundfish fishery and are not managed by other fishery management plans, are neither limited nor recorded (DiCosimo 1998b).

The Bering Sea/Aleutian Islands plan identified as "target species" walleye pollock, sablefish, Pacific cod, squid, Atka mackerel, Greenland turbot, yellowfin, flathead, and rock sole, arrowtooth flounder, Pacific ocean perch, and other flatfish and rockfish. "Other species," including sculpins, eulachon, capelin, sharks, skates, smelts, and octopus are not generally targeted, but are also taken in the groundfish fishery. Catches of both "target" and "other species" are limited and documented. Incidental catches of other "non-specified species" of fish and invertebrates, including grenadiers, eelpouts, sea urchins, and mussels, are neither limited nor recorded (Witherell 1997).

The four goals described by the North Pacific Council for all its fishery management plans are: 1) to promote conservation while providing for optimum yield,[16] 2) to promote efficient use of

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[14] These include western/central walleye pollock; Pacific cod; sablefish; shortspine thornyhead; arrowtooth flounder; and western, central, and eastern Pacific Ocean perch.

[15] These include Eastern Bering Sea walleye pollock; Pacific cod; yellowfin sole; Greenland turbot; arrowtooth flounder; rock sole; flathead sole; Eastern Bering Sea and Aleutian Islands sablefish; Eastern Bering Sea and Aleutian Islands Pacific Ocean perch; Atka mackerel; and Alaska plaice.

[16] Optimum yield is defined as that which provides "the greatest overall benefit to the nation with particular reference to food production and recreational opportunities; avoiding irreversible or long-term adverse effects on fishery resources and the marine environment; and insuring availability of a multiplicity of options with respect to the future uses of these resources" (NPFMC 1999b). In the case of an overfished fishery, optimum yield provides for

fishery resources, but not solely for economic purposes, 3) to promote fair resource allocation without allowing excessive privileges, and 4) to use the best scientific data available (NPFMC 1999b). Included in a list of secondary objectives are precautionary measures, including the flexibility to respond to unpredictability, providing for a "safety margin" when the quality of information is questionable, and the design of fishing strategies that minimize the effects of fishing on the environment (NPFMC 1999b). But more important than precautionary language are the concrete management measures themselves.

3.3.3 Fishery management measures

Scientific management of Alaska groundfish fisheries developed from efforts to control foreign fisheries when little domestic groundfish fishing existed (Trumble 1998). The overfishing of groundfish by foreign fleets provided an impetus for conservative management. Bilateral and multilateral negotiations with foreign fishing nations required scientific justification for conservation measures desired by the United States. Extended jurisdiction allowed for unilateral application of conservation management, as long as scientific justification existed.

Thus, a tradition of conservative management developed in the U.S. North Pacific region before the domestic fishery developed. And, although the original goal of domestic pollock fishery management was to develop the American fishing and processing industries, this conservative philosophy continued through the transition to domestic catch and management.

Pollock fisheries in both the Bering Sea/Aleutian Islands and Gulf of Alaska management areas are controlled through permits and limited entry, catch quotas, seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, and regulatory areas (Witherell 2000b; DiCosimo and Kimball 2001).

Catch specifications for the target and other species described in Section 3.3.2, and for the prohibited species identified in Section 3.3.5.2.2, are adopted by the North Pacific Council annually based on recommendations included in annual stock assessments, which are reviewed by advisors from the Council's groundfish plan teams and its Scientific and Statistical Committee. Overfishing specifications define the unacceptable catch level. Acceptable biological catch specifications generally define the acceptable catch level. And total allowable catch specifications are essentially annual catch quotas. These quota specifications account for the total groundfish catch, including discards, with an assumed 100 percent mortality rate (NPFMC 1999c).

However allocated, the total allowable groundfish catch may not exceed an absolute cap of 2,000,000 mt for the Bering Sea/Aleutian Islands region and 800,000 mt for the Gulf of Alaska. This is true regardless of groundfish biomass and even if acceptable biological catch is much higher (NPFMC 1999c). Managers established these caps in the very first groundfish fishery management plan. In addition, they set aside 15 percent of the total allowable catch as a "reserve," to account for unforeseen circumstances each year: "to correct operational problems in

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rebuilding to a level consistent with producing maximum sustainable yield. Optimum yield is based upon the maximum sustainable yield for a given fishery, as reduced by relevant economic, social or biological factors...." (Witherell 1997).

the fisheries, to adjust species [total allowable catch quotas] according to stock conditions" and for other purposes (Witherell 1997).

The reserve quota is made up of the total of 15 percent of each of the species specific total allowable catch quotas, which are established annually based on consideration of maximum sustainable yield, equilibrium yield, and optimum yield for the groundfish complex as a whole. Since 1992, one-half of the annual Eastern Bering Sea pollock reserve has been assigned to the CDQ program because of managers' confidence in the accuracy of the weekly catch reports (Hartley 2000). Catches are closely monitored in-season through strict reporting requirements and a comprehensive observer program. And management measures provide for cessation of the fishery when the total allowable catch quota has been taken.

3.3.4 Regulating the effects of fishing on target species

3.3.4.1 Legal requirements

The requirements for federal fishery management plans to define and remedy overfishing have gone through two distinct phases. The first phase began in 1989 with the publication of the NMFS' National Standard 1 guidelines, which required definitions of recruitment overfishing and corresponding management plans to avoid recruitment overfishing and/or to rebuild stocks that had been reduced in size as a result of recruitment overfishing.

The second phase began in October 1996 with the reauthorization and revision of the Magnuson Fishery Conservation and Management Act (MFCMA). Congress made many significant changes to the Act in 1996 but, in terms of overfishing definitions, the most significant change was just a single word. The definition of "optimum yield" was changed from "...[maximum sustainable yield] as ***modified*** by" relevant factors to "...[maximum sustainable yield] as ***reduced*** by" relevant factors (Section 3, Definitions, 104-297 28(B)).

In preparing National Standard Guidelines for the fishery management councils, the NMFS interpreted this change to mean that maximum sustainable yield or, more correctly, the fishing mortality at maximum sustainable yield (F_{MSY}) should be an upper bound (limit) on fishing mortality; i.e. that overfishing limits or thresholds should be based on F_{MSY} or relevant proxies. Thus, when the guidelines were published in 1998, the emphasis changed from avoiding recruitment overfishing to avoiding fishing mortalities higher than the fishing mortality at which maximum sustainable yield is achieved (F_{MSY}) (63 FR 24212; NMFS 1997).[17] Although not all regional fishery management councils have yet established fishing mortality rates in accordance with this stricter standard, the North Pacific Council has historically managed at a much more conservative rate, as described in the following section.

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[17] By definition, recruitment overfishing must occur at higher fishing mortality than F_{MSY}. Therefore, treating F_{MSY} as an upper bound on fishing mortality should automatically avoid recruitment overfishing to the extent that parameter estimation is accurate. Effectively, the text in the 1996 Magnuson-Stevens Fishery Conservation and Management Act gave rise to a change in the limit fishing mortality from approximately $F_{20\%SPR}$-$F_{30\%SPR}$ to $F_{30\%SPR}$ - $F_{40\%SPR}$ (Pamela Mace, National Marine Fisheries Service, personal communication. 2000, quoted in Parkes (2001) Understanding SPR and its Use in U.S. Fishery Management. White Paper prepared for The Ocean Conservancy, Washington, DC.

3.3.4.2 Managing exploitation

The earliest exploitation strategies used in pollock fishery management involved monitoring changes in catch per unit effort, and adjusting catches to keep catch per unit effort within a chosen range (Trumble 1998). As population models became available, catch recommendations were generally developed through application of an exploitation rate to an estimated biomass. Analysts often developed unique approaches for determining exploitation rates and the North Pacific Council desired a consistent approach and standard methodology.

Clark (1991, 1993) determined that maintaining spawning biomass at 20-60 percent of the unfished level provides at least 75 percent of maximum sustainable yield, regardless of stock- recruitment relationships. A fishing mortality rate that reduces spawning biomass per recruit to about 35 percent of the unfished level ($F_{35\%}$) achieves this goal. Variable recruitment, especially with serial correlation, calls for a slightly lower target F ($F_{40\%}$). The North Pacific Council adopted an overfishing threshold of $F_{35\%}$ in 1995 and in 1996 (Trumble 1998). Following amendment of the MFCMA, the Council moved to adopt a threshold of $F_{40\%}$ in 1997.

The maximum allowable fishing mortality rate used to calculate acceptable biological catch and overfishing levels is defined using a set of six tiers, each corresponding to the amount and reliability of available scientific information, from the most reliable point estimates of biomass, maximum sustainable yield and probability density function, down to the least information available, which is reliable catch history from 1978 through 1995. The less information, the lower the allowable fishing mortality rate, and the more restrictive the overfishing level. Appendix D describes specific information requirements associated with each of the six tiers (NPFMC 2000).

Tightly controlled catch quotas ensure that catches are maintained within biologically acceptable levels. Since 1980, the total allowable catch of Eastern Bering Sea and Gulf of Alaska pollock has averaged only 14 percent and 7 percent of the total estimated pollock biomass, respectively (Tables 1 and 2). Figures 3 and 4 illustrate Eastern Bering Sea and Gulf of Alaska pollock catches relative to biomass and catch specifications.

3.3.4.3 Stock status, trends, and catch specifications

In contrast to the overfishing and collapse of many marine fisheries, tight restrictions on annual groundfish quotas have prevented overfishing of pollock since the implementation of the FCMA in 1977 (Shimada *et al*. 1998). Megrey and Wespestad (1990) have described the 20-year history of the fishery as a management success.

3.3.4.3.1 Eastern Bering Sea/Aleutian Islands

The stock assessment model for the Eastern Bering Sea shelf stock indicated biomass levels above B_{MSY} and above $B_{40\%}$ for the year 2000 assessment, but low recruitment in recent years may cause a future biomass decline (Ianelli *et al*. 2000).[18] Several versions of the stock assessment model, using different combinations of data or different assumptions, explored stock status. In all cases, models indicate that the Eastern Bering Sea shelf stock is not overfished and is not approaching an overfished condition through 2013 under the management rules adopted by the North Pacific Council.

Over a longer term, the Eastern Bering Sea shelf biomass rapidly increased from about 2,500,000 mt prior to 1980 to near 10,000,000 mt during the early 1980s. Since the shift to higher biomass levels, the average abundance has varied around 10,000,000 mt, although a decline to around 5,000,000 mt occurred in the late 1980s and early 1990s.

Estimates of acceptable biological catch values for 2001 are 1,842,000 mt based on $F_{40\%}$, and 2,125,000 mt based on F_{MSY} (Ianelli *et al*. 2000). The North Pacific Council set the overfishing level at 3,536,000 mt, the acceptable biological catch at 1,842,000 mt, and the total allowable catch at 1,400,000 mt. The final total allowable catch was set at a level that was 24 percent below the acceptable biological catch.[19]

Analysis of pollock from the Aleutian Islands region suggests that these fish are unlikely to represent a discreet stock and may potentially be from the Bering Sea shelf stock (Ianelli *et al*. 2000), because pollock are continuously distributed from the Eastern Bering Sea (Ianelli *et al*. 2000, 2001). Trawl survey data show that most of the biomass is located in the eastern Aleutian Islands and along the north side of Unalaska-Umnak islands in the Eastern Bering Sea region. The stock definition for “Aleutian Islands pollock” is therefore confounded with Bering Sea abundance levels and abundance in the Aleutian Basin. Pollock in the Aleutian Islands region is considered only as an “operational stock” for management, with biomass levels on the order of 100,000 to 200,000 mt (for fish age three and older). In the past two years, catch levels in this region have only been about 1,000 mt, and directed pollock fishing has been prohibited.

Ianelli *et al.* (2000) recommended using Tier 5 management applied to the trawl survey biomass, until stock structure relationships for the Aleutian Islands region are better defined. The Council set an acceptable biological catch level of 22,800 mt and a total allowable catch quota of 2,000 mt. While Ianelli *et al*. (2000) did not determine if the stock is overfished, they note that abundance has stabilized in recent years, but at a lower level than in the 1980s.

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[18] The recently released draft 2001 assessment (Ianelli *et al*. 2001) reports a 19.5 percent decrease in the bottom trawl survey estimate of abundance in 2001 compared to 2000 (4,140,000 mt, compared to 5,140,000 mt). This drop was in line with expectations based on the estimated age structure relative to the pattern of availability to the trawl survey.

[19] The recently released draft 2001 assessment (Ianelli *et al*. 2001) provides updated values for 2002. Estimates of ABC values for 2002 are 2,269,000 mt based on $F_{40\%}$, and 2,108,000 mt based on F_{msy}. The lower ABC corresponding to F_{msy} this year apparently reflects the level of uncertainty about stock size. The 2002 overfishing level alternatives for the reference model are 2,833,000 and 3,531,000 mt corresponding to $F_{35\%}$ and F_{msy} (arithmetic mean). The draft assessment report recommends maintaining the total allowable catch quota at 1,400,000 mt to account for uncertainty in stock size, and in potential changes in catch rates on the eastern Bering Sea stock outside of the U.S. Exclusive Economic Zone (particularly for pre-recruit age groups). Concern also remains over the apparent continuing declines in Steller sea lion populations.

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The Bogoslof Island-Aleutian Basin stock appears distinct from those of the Eastern Bering Sea (Ianelli *et al*. 2000, see also Section 3.2.1.3). These groups have different spawning time, fecundity, and size at age. But few pollock younger than five years old have been found in the Aleutian Basin. Recruits likely come from the surrounding continental shelves in either the Russian or the U.S. Exclusive Economic Zone. In spite of five annual meetings of the members of the Pollock Convention (NMFS 2000b), the parties concluded that insufficient data exist to directly estimate the Aleutian Basin pollock biomass. The Pollock Convention did assign an "Annual Harvest Level" of zero for the Aleutian Basin, as biomass was too low to allow fishing under Convention policy.

Ianelli *et al*. (2000, 2001) note that the biomass estimates based on trawl surveys have declined from the late 1980s (2,100,000 to 2,400,000 mt) to the early 1990s (500,000 to 900,000 mt). Following a temporary increase in 1995 to 1,100,000 mt, which was at least partly caused by movement of pollock from the 1989 year-class to the Bogoslof Island area, biomass estimates have continued to decline, even in the absence of fishing. The most recent biomass estimate for 2001 is 230,000 mt.

Ianelli *et al*. (2000) calculated the acceptable biological catch level for the U.S. portion of the Aleutian Basin using 1) Tier 5 management applied to the trawl survey biomass, and 2) Tier 3 management using an assumed $B_{40\%}$. The North Pacific Council set an acceptable biological catch level of 8,470 mt and a total allowable catch quota of 1,000 mt.[20]

3.3.4.3.2 Gulf of Alaska

The Gulf of Alaska estimated biomass trend through the early 1980s (Dorn *et al*. 2000, 2001) was similar to that of the Bering Sea, showing a rapid increase from the late 1970s to a peak in 1981/1982 (over 4,000,000 mt.). In contrast to the Bering Sea, the Gulf of Alaska biomass then declined steadily up to the year 2000. Current estimated biomass levels are at their lowest levels over the period of the assessment, but the most recent assessment indicates there has been an increase in 2001 driven by higher recruitment of age-two pollock (Dorn *et al*. 1999, 2001). According to the 2001 assessment, the catch rate (the catch in biomass divided by the total biomass of age-three plus pollock at the start of the year) from 1998 to 2000 (14 percent in each of the three years) was at its highest level since 1985 (also 14 percent), and is currently at its highest sustained level over the entire period of the assessment.

The definitions of overfishing level and maximum permissible F_{ABC} under Amendment 56 of the Gulf of Alaska groundfish fishery management plan provide a buffer between the overfishing level and the intended catch rate, as required by the NMFS' national standard guidelines. The buffer between the overfishing level and the acceptable biological catch provides a margin of safety because estimates of stock biomass from assessment models are uncertain. This

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[20] Ianelli *et al*. (2001) provides an update to this assessment. Tier 5 computations use the most recent survey biomass estimate applied to an adjusted natural mortality. This gives an acceptable biological catch (2001 survey biomass _ M _ 0.75) of 34,800 mt at a biomass of 232,000 mt (with $M = 0.2$). The overfishing level is 46,400 mt. Based on the discussions of the Scientific and Statistical Committee for further reductions in acceptable biological catch based on considerations of a target stock size of 2,000,000 mt, the acceptable biological catch level for the Bogoslof region for 2001 was 4,310 mt.

assessment error should therefore not result in the overfishing level being inadvertently exceeded. For Gulf of Alaska pollock, the maximum permissible F_{ABC} catch rate is 83.5 percent of the overfishing level catch rate.

The 2001 acceptable biological catch of 100,770 mt recommended by the assessment author and the North Pacific Council's Groundfish Plan Team was based on the maximum permissible acceptable biological catch (Dorn *et al*. 2000). The total allowable catch for Gulf of Alaska pollock set by the Council and NMFS is below this level (90,690 mt) (NMFS 2001e). Two of the three surveys in 2001 indicated sharp declines in the abundance of adult pollock in the Gulf of Alaska to levels lower than projected. It now appears that, had the entire recommended acceptable biological catch been taken in 2001, the overfishing rate would have been slightly exceeded (Dorn *et al.* 2001).

Actual 2001 catches are expected to be substantially below the acceptable biological catch recommendation and also below the total allowable catch (preliminary estimates are 73,800 mt). Nevertheless, this has demonstrated a potential weakness in the assessment process. Despite the inclusion of a buffer intended to provide adequate protection against uncertainty, an acceptable biological catch was recommended that could have resulted in overfishing. The buffer was clearly insufficient, particularly because at lower stock levels (i.e., as the stock declines) the safety margin was reduced (Dorn *et al*. 2001).

The assessment team responded to this problem in the 2001 assessment by recommending to the North Pacific Council a new approach defining the $F_{40\%}$ catch rate that provides a constant buffer for assessment error regardless of stock level (Dorn *et al*. 2001). The major remaining uncertainty in the 2001 assessment is the size of the 1999-year class, on which much of the projected growth in the population after 2002 appears to be based.

3.3.4.3.3 Western Bering Sea

Stepanenko *et al*. (1999) reported on the Navarin pollock stock assessment for 2000. Echo-integration trawl surveys showed a declining abundance trend from 2,000,000 mt in 1996 to 1,300,000 mt in 1997, to 900,000 mt in 1998, and to 400,000 mt in 1999. Dense concentrations of pollock over the entire area, including the Olyutorsky stock, during the early 1990s gave way to density discontinuities and patches of pollock concentrations only in the Navarin area. These observations support the conclusion from Virtual Population Analysis models that a sharp decline of stock biomass occurred in 1993-1995 to the lowest spawning stock biomass since 1970 (Babayan *et al*. 1999).

Over a longer period, the total western Bering Sea biomass (age two plus) increased from 500,000 mt in 1970 to around 2,000,000 mt from 1980 to 1991 (Stepanenko *et al.* 1999). Subsequently, biomass dropped rapidly to about 250,000 mt in 1995, where it has stabilized. Some Russian scientists attribute the dramatic changes to oceanic regime shifts.

Wespestad (1996) (in Pautzke 1997) reported that pollock catches in the Russian Exclusive Economic Zone totaled 2,471,000 mt in 1995, of which 406,000 mt came from the western Bering Sea. Seafood Business Online (2001) reports that the 2001 Russian pollock quota will total 1,870,000 mt, but suggests that fewer fish actually exist. Stepanenko *et al*. (1999) indicate

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that landings from the Navarin area totaled only 50,000 to 100,000 mt per year from 1995-1998. Babayan *et al*. (1999) recommended a precautionary approach that eliminates the large-scale fishery, and a quota of 40,000 mt for the near-term fishery.

Even with conservative (weak) forecasts of recruitment, the recommended quota should result in a gradual recovery of the stock. Stepanenko *et al.* (1999) report that 1995-1997 year classes were above the long-term mean level, but also that the 1998-year class strength was weak. Russia has reduced the fleet size in its zone as the biomass decreased. The number of large-tonnage fishing vessels has decreased from 110-115 vessels in 1998, to 61 vessels in 1999, and to 40-45 vessels in 2000 (Russian Party 2000a). Landings also decreased from 680,000 mt in 1997 to 311,000 mt in 2000 (Russian Party 2000a).

It is important to note that catch (and research) data from the Russian zone cannot be independently verified, and are accepted by the United States in good faith. But catches may be higher than indicated in the official statistics. Alexey Vaisman has reported incidences of poaching and underreporting of pollock catches in the western Bering Sea (Vaisman 2001). And Russian Prime Minister Mikhail Kasyanov noted that continued poaching remains a serious problem in Russian fisheries (World Catch 2001a). Thus, some level of unreported pollock catch may occur. Pautzke (1997) reports that without some mechanism for coordinated, verifiable, and sustainable management and conservation of Bering Sea transboundary pollock stocks, their long-term outlook could be threatened.

3.3.4.3.4 Donut Hole

The Aleutian Basin pollock stock is in critical condition, and the fishery is currently under a moratorium. The Pollock Convention set a minimum biomass threshold of 1,670,000 mt for fishing to continue, a level that is substantially above recent biomass estimates of about 500,000 mt. The Convention allows member nations to conduct trial fishing, but not all members are operating trial fisheries. China’s 2000 trial fishery reportedly encountered few fish (Pollock Workshop 2000).

3.3.4.4 Recruitment and year class strength

The population and fishery dynamics of walleye pollock are strongly influenced by intermittent recruitment of strong year classes (Bailey *et al.* 1999). The Eastern Bering Sea may share strong year classes (e.g., 1978) with both the Gulf of Alaska and the western Bering Sea. But strong year classes (e.g., 1982, 1984 and 1989) in the Eastern Bering Sea did not occur in the Gulf of Alaska. And strong Gulf of Alaska year classes (e.g., 1976, 1977, 1979, and 1988) did not occur in the Eastern Bering Sea (Bailey *et al.* 1999).

As discussed in Section 3.2.1.1, Eastern Bering Sea pollock exhibit extensive cannibalism – about 80 percent of the mean stomach contents of adult pollock are composed of age-zero pollock (Bailey *et al*. 1999). Cannibalism is prevalent in other areas, but is noticeably less in the Aleutian Basin and Gulf of Alaska. Pollock make up a higher proportion of all fish in the Eastern Bering Sea than in the Gulf of Alaska. And cannibalism may be higher in the Bering Sea than in the Gulf of Alaska because juvenile pollock make up a high proportion of the available prey distribution for larger pollock (Ianelli *et al*. 2000).

Using stock and recruitment data over a period of nearly 30 years, Wespestad and Quinn (1996) fitted a Ricker spawner-recruit curve indicating strong density dependence in Eastern Bering Sea pollock recruitment. The authors attributed the density dependence to cannibalism of juvenile pollock by adult pollock. According to the model, fishing has little effect on recruitment, unless density dependence is moderate, in which case it is increased by fishing. Yield is enhanced at intermediate population levels. The model further suggests that population oscillations would be greater at high levels of abundance, especially if density dependence is high.

Swartzman and Haar (1983) (in Bailey *et al*. 1999) proposed that the commercial fishery for pollock removed older, cannibalistic pollock, reducing the mortality of juveniles, thereby making them available as forage for fur seals.

Inter-annual environmental variability affects the pollock spawner-recruit relationship by increasing or decreasing the separation of adult and juvenile pollock. Increased separation reduces cannibalism (Wespestad *et al*. 2000). Wespestad *et al*. (2000) propose that passive transport by ocean currents carries eggs and larvae inshore from the spawning areas to inshore areas of low adult pollock density. Increased separation occurs during warm periods, associated with the Aleutian Low. A one-year lag indicates that the effects occur primarily in the first year.

Pacific cod, fur seals, and adult pollock are the main predators of young pollock (Livingston 1993, cited in Livingston and Methot 1997). Livingston and Methot (1997) used the stock synthesis model to incorporate mortality from the three predators in a single-species assessment of Eastern Bering Sea pollock. Cannibalism occurs on age-zero and age-one pollock. Fur seals and Pacific cod prey on age-two pollock, but these species accounted for only a small increment of mortality compared to cannibalism.

An asymptotic spawner-recruit relationship for age-one recruits and declining number of age- three recruits at high biomass highlights the importance of cannibalism on age-one pollock in reducing the number that recruit to the fishery (Livingston and Methot 1997). Factoring in climate effects on transport, as suggested by Wespestad *et al*. (2000), improved predictions. Spawner-recruit modeling with cannibalism increases the number of year-one recruits compared to modeling without cannibalism. In spite of increased age-one recruits with cannibalism, only a slight increase in exploitable biomass occurred, compared to the model without cannibalism.

The Ricker spawner-recruit curve calculated in the 2000 Bering Sea assessment (Ianelli *et al*. 2000) matched very closely to the no-predator curve of Livingston and Methot (1997), and showed a slightly declining recruitment at high abundance. The Ricker spawner-recruit curve can take cannibalism into account to some degree because it allows for density dependence. But cannibalism is not explicit in the 2000 stock assessment.

Neither the Eastern Bering Sea nor the Gulf of Alaska stock assessments use a spawner-recruit relationship in the assessment model. Instead, the assessments use proxies for recruitment. Age- one pollock data from the echo-integration trawl and bottom trawl surveys are included in the Eastern Bering Sea model as an index of recruitment (Ianelli *et al.* 2000). Regression of age-one pollock against age-three pollock indicates a linear relationship used to predict age-three pollock abundance.

The recruitment forecast for the Gulf of Alaska pollock uses five sources, three physical and two biological (Dorn *et al.* 2000). Observed precipitation at Kodiak, the first physical source, is considered a valid proxy for freshwater runoff that contributes to the density contrast between coastal and Alaska Coastal Current water. Greater contrast contributes to eddies and other secondary circulation features beneficial to larval pollock survival.

Estimated wind mixing at 57N-156W, the second physical source, reflects the nutrient mixing into the upper ocean layer. Greater winter mixing brings more nutrients, and provides a basis for a spring phytoplankton bloom. Weak spring winds provide a stable water column that better enables first feeding of pollock larvae. Week advection of ocean water in the vicinity of Shelikof Strait, the third physical source, correlates with good recruitment.

The first biological source, a larval abundance index based on counts of survey catches, correlates with recruitment. The second biological source is the estimated abundance of two-year old pollock. The probability of a weak (average) (strong) year class is calculated for following a weak (average) (strong) year class two years earlier.

3.3.5 Regulating the effects of fishing on non-target and protected species

3.3.5.1 Legal requirements

Several federal laws require fishery managers to act to reduce the adverse effects of fisheries on non-target finfish and shellfish, and on protected species. The most important of these are the M-SFCMA, ESA, and the Marine Mammal Protection Act (MMPA).

The M-SFCMA's National Standard 9 requires that fishery management measures minimize bycatch and bycatch mortality to the extent practicable, and that fishery management plans establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the managed fishery.

Differences in interpretation of the term "bycatch" can result in confusion when processing data and information on incidental catch and discards. While the term is commonly used to describe the incidental take of non-target species in fishing operations, the legal definition of bycatch provided by the M-SFCMA is "fish which are harvested in a fishery, but which are not sold or kept for personal use…[including] economic discards and regulatory discards" (16 U.S.C. 1802, Sec. 3(2)).

Thus, the Act defines as bycatch only the component of targeted and non-targeted catch that is discarded. To avoid confusion here, we use the term "discards" to refer to the portion of catch that is not retained for sale or for personal use, and the term "incidental catch" to describe the take of non-target species incidental to the directed fisheries.

The ESA requires that federal agencies use their authorities to conserve endangered and threatened species, and that they ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of those species or to adversely modify or destroy the habitat designated to be critical to their survival and recovery.

The MMPA prohibits, with certain exceptions, the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and requires designated federal authorities to maintain populations of marine mammals at optimum levels, defined as "…the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element."

The NEPA also requires decision makers, like the regional fishery management councils and NMFS, to consider the impacts of their proposed actions on the natural (and human) environment. To comply with this law, fishery managers must consider all possible alternatives to their proposed actions and analyze the consequences of a variety of alternatives. This procedure, as it applies to fisheries management, provides additional information, analysis and opportunity for comment to the public, and applies a much broader scope of consideration than does the fishery management process alone.

The NEPA requires fishery managers to determine whether a proposed action requires preparation of an environmental impact statement, and to prepare one in conjunction with a fishery management plan if needed. The intent of this Act is for decision makers to have the benefit of the environmental analysis in an environmental impact statement before concluding what their preferred alternative might be.

Appendix E provides more information on these and other federal laws affecting fishery management decision making.

3.3.5.2 Managing incidental catches and discards

Fishery managers have taken a number of actions designed to minimize incidental catches and discards in the pollock fisheries. These include placing limits on catches of prohibited species (identified in Section 3.3.5.2.2), implementing requirements for the improved retention and utilization of select species, creating no trawl zones, requiring the use of observers and catch monitoring, and making individual vessels publicly accountable for incidental catches and discards. In addition, the industry itself created cooperatives that slowed fishing substantially, thereby reducing the occurrence of incidental catches and discards.

This aggressive bycatch monitoring and reduction program is the best developed of any federal fishery (NMFS 1998). The Marine Fish Conservation Network, a coalition of conservation, fishing, environmental, and other public interest organizations, reported in a 1999 evaluation of council response to bycatch requirements that the North Pacific system "may be providing a better estimate of total catch than can be found in any other region of the country" (MFCN/CMC 1999).

In comparison, the two other major U.S. groundfish fisheries in the Northeast and Pacific regions have continued to rely on more traditional tools to manage bycatch (e.g., minimum mesh size regulations, gear and area restrictions). And the observer programs in place in the Northeast groundfish fishery and planned for the Pacific groundfish fishery have only a fraction of the coverage provided by the North Pacific's program (Cornish 2001). The failure of fishery managers to adequately manage, monitor, and account for discards in the Pacific and Northeast groundfish fisheries has resulted in lawsuits and court findings that stricter actions are needed.

3.3.5.2.1 Total pollock discards in all fisheries

Catch data on North Pacific fisheries are generally aggregated and summarized/reported by fishery managers on a species-specific basis, as the product of all fisheries operating in a defined management area. The data on pollock catches and discards contained in Tables 5 and 6 and summarized in this section are derived from such summaries. They provide an estimate of the sum total of pollock catches and discards in *all North Pacific fisheries*, including those that target pollock, as well as those that take pollock incidental to the catch of various other target species.

Table 5 provides estimates of total pollock catches and discards in all Bering Sea/Aleutian Islands fisheries from 1990 to 1999. Pollock discards averaged 7.1 percent of the total pollock catch during that ten-year period, ranging from a high of 11 percent in 1991 to a low of 1.5 percent in 1998 (Ianelli *et al.* 2000). In the Gulf of Alaska, total pollock discards as percentage of total pollock catch averaged 7.7 percent from 1991 to 1999, ranging from a high of 14.4 percent in 1992 to a low of 0.8 percent in 1998 (Table 6) (Dorn *et al.* 2000).

The higher values in 1991 and 1992 have been attributed to an increase in the abundance of juvenile pollock, resulting from the recruitment of a 1989 year-class that was the second largest on record (NFPMC 1999a). The lower values in 1998 and 1999 reflect the implementation of the North Pacific Fishery Management Council's Improved Utilization and Improved Retention program, which requires that all authorized catches of pollock be retained for processing (Ianelli *et al.* 2000). Pollock discards have been reduced considerably since the Improved Utilization and Improved Retention program was implemented in 1998. Current discards could be attributed to several different scenarios, as follows.

First, when directed fishing for a species included under the Improved Utilization and Improved Retention program is prohibited, retention of that species is required only up to any "maximum retainable bycatch amount" in effect for that species. Under this rule, vessels that are not authorized to catch pollock must retain incidental catches of pollock only up to a maximum amount defined as 20 percent of their total catch. Pollock captured in excess of this established limit must be discarded.

Second, whole fish intended for the production line may occasionally make their way into the offal produced in factory operations, resulting in unintended losses that are documented by observers as discards.

Third, also documented as discards are losses resulting from uncontrollable events routinely associated with fishing operations, such as gear failure (e.g., pollock that escape through a ruptured cod end) and other accidents (e.g., landed fish washed off the deck by waves) at sea.

Finally, non-food grade fishes, such as fish that are rotted, that contain parasites, or that are otherwise inedible, are discarded, a practice that is authorized by the discard code (personal communication, NMFS Alaska Regional Office, 12-20-01).

3.3.5.2.2 Discards in the directed pollock fisheries

Because catch data are summarized and reported by fishery scientists and managers on a species-specific basis, it is generally not possible to evaluate status and trends on a fishery-by-fishery basis using the information routinely produced in Stock Assessment Fishery Evaluation documents and other reports.

There are exceptions. For example, the Pollock Conservation Cooperative and High Seas Catchers' Cooperative detail on an annual basis both the amount and composition of catch captured and discarded by each Pollock Conservation Cooperative and High Seas Catchers' Cooperative vessel participating in the directed Bering Sea/Aleutian Islands pollock fishery.[21]

Unfortunately, such information is not routinely made available for the fishery as a whole. Consequently, the catch and discards data on the directed Bering Sea/Aleutian Islands and Gulf of Alaska pollock fisheries provided in Tables 7 and 8, respectively, were calculated from blend data provided by the NMFS, Alaska Regional Office upon special request.

While directed pollock fisheries are legally defined as those in which pollock comprise 90-95 percent of the catch (50 CFR 679), in compiling these data on catch and discards in the directed pollock fisheries, the NMFS combined discards from fisheries in which pollock comprised 90-95 percent of the catch *and* from fisheries where pollock represented the predominant species in the catch. So if, for example, the weekly reported catch taken by a vessel that is not necessarily targeting pollock is composed of 35 percent pollock, 30 percent cod, 30 percent flatfish and 5 percent crab, that catch data would be included here as data for the directed pollock fishery. Data represent all discards in these directed pollock fisheries, except those of species identified as "prohibited."

Prohibited species include Pacific halibut, Pacific herring, Pacific salmon, Steelhead trout, King crab and Tanner crab, and must be returned to the sea with a minimum of injury unless previously authorized by the NMFS (NPFMC 1999b).[22] Groundfish species and species groups for which the quotas have been achieved are treated in the same manner as prohibited species (DiCosimo 1998b; Witherell 1997).

Prohibited species catch data are recorded in different units than the above-referenced data, and so are presented separately in Tables 9 and 10. Again, in compiling these data, directed pollock fisheries were defined as those in which pollock represented the dominant species in the catch.

[21] For more information, see Table 2 in Pollock Conservation Cooperative and High Seas Catchers' Cooperative (PCC and HSCC). 2001. Joint Report of the Pollock Conservation Cooperative and High Seas Catchers' Cooperative 2000. Presented to the North Pacific Fishery Management Council, 31 January.

[22] Participants in the Prohibited Species Donation Program may donate Pacific salmon and Pacific halibut bycatch to economically disadvantaged individuals through a NMFS authorized distributor (NPFMC 1999b).

Table 9 depicts prohibited species catch in the directed Bering Sea/Aleutian Islands pollock fishery; Table 10, prohibited species catch in the directed Gulf of Alaska pollock fishery.

3.3.5.2.2.1 Directed Bering Sea/Aleutian Islands pollock fishery catch and discards summary

Estimated discards of pollock and non-target groundfish species in the directed Bering Sea/Aleutian Islands pollock fishery ranged from 3.78 percent to 1.01 percent of total catch from 1997-2000. Discards have not exceeded 1.10 percent of total catch since the implementation of the Improved Retention/Improved Utilization program in 1998 (Table 7).

During that same period of time, this fishery captured, on average, 0.22 kg halibut per mt of groundfish, 0.025 crabs per mt of groundfish, and 0.067 salmon per mt of groundfish (Table 9). The 2000 incidental catch rate of all three of those prohibited species was either the lowest recorded rate, or tied for the lowest recorded rate, during that four-year period.

The average incidental catch rates of herring, also a prohibited species, are not included in Table 9 because herring discards are reported in a different format. To provide the evaluation team some indication of the fishery's impact on herring, the midwater pollock trawl fishery discarded 1,065 mt of herring in 1997, 750 mt of herring in 1998, 785 mt of herring in 1999, and 482 mt of herring in 2000 (NMFS 2001c).

3.3.5.2.2.2 Directed Gulf of Alaska pollock fishery catch and discards summary

Estimated discards of pollock and non-target groundfish species in the directed Gulf of Alaska pollock fishery ranged from 5.96 percent to 1.14 percent of total catch from 1997-2000 (Table 8). Discards have declined since the implementation of the Improved Retention/Improved Utilization program in 1998, but continue to represent a slightly larger proportion of the catch than do discards in the directed Bering Sea/Aleutian Islands pollock fishery. These higher values have been attributed to the continued use of bottom trawl gear in that management area. In 1999, the rate of pollock discard in the Gulf of Alaska pelagic trawl pollock fishery was 0.4 percent, compared to 0.7 percent in the Gulf of Alaska bottom trawl pollock fishery (DiCosimo and Kimball 2001).

In addition to pollock and non-target groundfish, the directed Gulf of Alaska fishery captured, on average, 0.564 kg halibut per mt of groundfish, 0.009 crabs per mt of groundfish, and 0.222 salmon per mt of groundfish from 1997-2000 (Table 10). 2000 incidental catch rates for all three of these prohibited species were the highest recorded during that four-year period. The cause of this increase has not been formally analyzed.

Herring is also captured incidental to this fishery, but average incidental catch rates for this species are not included in Table 10 because the data needed to estimate those values are not readily available. But those data do exist and may be requested from the NMFS, Alaska Regional Office.

3.3.5.3 Managing interactions with and impacts on protected species

Protected species include animals listed as depleted under the MMPA, or as endangered or threatened under the ESA (See Section 3.3.5.1; Appendix E). These listings trigger actions to reduce the effects of fishing on the recovery of affected species, for example, deterrents to prevent incidental takes of endangered albatross on longlines, or closures around walrus haul-out and rookery areas to keep vessel disturbance to a minimum.

Managers have taken numerous actions designed to minimize the adverse impacts of the Bering Sea and Gulf of Alaska groundfish fisheries on protected species. Mandated gear modifications, avoidance devices, and changes in fishing methods have focused on reducing the incidental mortality of seabirds while fishing with hook-and-line gear (DiCosimo 1998a). And seasonal closures have been implemented to protect walrus (Witherell 1997). A brief discussion of the potential impacts of the pollock fishery on the northern fur seal is provided in Section 3.3.5.3.2.

The Steller sea lion has been the primary focus of regulatory actions affecting the directed pollock fisheries and the subject of intense controversy, particularly over the last decade, culminating in 2000 in a court order enjoining "all groundfish trawl fishing within Steller sea lion critical habitat in the oceans of the BSAI and GOA…as such critical habitat is defined by regulation, until further order of this court" (*AOC v. Daley*, 7 August 2000).

The timeline illustrated in Box 1 provides an extremely simplified overview of the history and procedural status of the Steller sea lion debate. Table 1 details the full procedural history, and shows how complicated the decision process becomes once a species is listed and the requirements of the ESA are overlain upon the already complex fishery management planning process.

Protection under the ESA is triggered by 1) listing of a species as endangered or threatened with extinction, a solely biological decision, and 2) designation of critical habitat. Listing provides for immediate steps toward protection, including bans on killing and harming the animal, or trafficking in the species or products. When a federal agency is taking an action that may affect an endangered species, it must consult with the U.S. Fish and Wildlife Service or the NMFS to ensure that the proposed action will not affect the species or its critical habitat.[23] This is known as a Section 7 consultation.

In cases where the consulting agency finds a conflict between the needs of a listed species and a proposed project ("jeopardy"), that agency must provide "reasonable and prudent alternatives" to the action that will minimize its harmful effects on the protected species. The finding of whether the proposed action is likely to jeopardize the continued existence of the species, and

[23] Of the marine species, NMFS has responsibility for whales, dolphins, porpoises, seals, sea lions, marine turtles, and fishes. The U.S. Fish and Wildlife Service is responsible for seabirds, walruses, sea otters, manatees, dugongs, nesting sea turtles and their hatchlings while on land, and polar bears.

recommended alternatives, if any, are analyzed and presented in a document called a biological opinion, or BiOp.

Contributing to the difficulty of the Steller sea lion case has been the dual role of the NMFS, which finds itself in both the role of the "action agency" and the "consulting agency." The NMFS has stewardship responsibility for protected marine species including Steller sea lions, including the duty to consult with other federal agencies proposing actions that may affect Steller sea lions. In this case, the NMFS also was the agency proposing the action: a total allowable catch quota for walleye pollock, believed to be a prey species for the Steller sea lion, in a fishery occurring in critical habitat.[24]

Further confounding the situation has been the delegation of planning to the North Pacific Council, a body that is arguably advisory to the NMFS, and that had not traditionally taken on the responsibility for recovering depleted or endangered marine mammals, though it had responded in its fishery planning to agency initiatives and requirements aimed at contributing to sea lion recovery.

Beginning in 1991, lawsuits challenging agency science, decisions on catch allowances in the fishery, and compliance with the NEPA and ESA set a tone of conflict between North Pacific Council and agency decision makers, and various stakeholder groups. A large amount of scientific, legal, and regulatory activity was spawned during this period of intense scrutiny and confrontation.

Box 1. Timeline of major Steller sea lion actions

Date	Event	Action
1988	Steller sea lions decline	Listed as depleted
1989	Petition	Calls for endangered listing
1990	Decline continues	Listed as threatened
1990	Section 7 consultation	No jeopardy, TAC proposed
1991	Section 7 consultation	No jeopardy, TAC proposed
1991	Lawsuit	NMFS' no jeopardy decision upheld
1996-1998	Decline continues, reinitiate consultation	Find jeopardy, RPAs limited
1998	EIS issued for alternate TAC levels	Response to RPAs limited to TAC levels
1999	Lawsuit	NMFS overturned, alternatives insufficient
2000	Begin Programmatic Supplemental EIS, do new consultation, issue BiOp	Court finds NMFS' work inadequate, fishery closed; Find jeopardy, new RPAs enter into effect
2001	New BiOp	Find no jeopardy
2002	New RPAs reviewed, recommended, published	Protection measures in place for 2002 fishery

[24] The action also included authorization of the Pacific cod and Atka mackerel fisheries. All three were potential sources of jeopardy or adverse modification of critical habitat for sea lions. The injunction prohibited all groundfish trawling inside critical habitat.

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As illustrated in Table 11, multiple versions of documents and actions created a confusing array of information, but no more or less than has resulted from similar high-profile natural resource conflicts. While the burden of responding to litigation has substantial affected the management system, the Steller sea lion controversy has also stimulated a great deal of science, and managerial actions to improve compliance with the array of mandates for which the NMFS is accountable (See Section 4.3.2.2 for a description of initiatives to improve compliance).

Although a federal district court continues its oversight of the process, the situation has stabilized somewhat in the January 2002 publication of measures to protect Steller sea lions, and the 2002 allowable catch specifications.

3.3.5.3.1 Steller sea lion status, science, and regulatory actions

The western population of Steller sea lions (west of Cape Suckling, Alaska) has declined by more than 70 percent since the 1960s and is listed as “endangered” under the ESA. The eastern population of Steller sea lions (east of Cape Suckling) is classified as “threatened,” but has shown a stable or increasing trend in abundance over the last two decades (NMFS 2001b). Incidental catch, entanglement of juveniles in commercial fishing gear, intentional shooting, subsistence hunting, nutritional stress, and possibly disease and predation, have all been identified as factors contributing to the documented decline in Steller sea lion populations (NMFS 2001b).

Past regulatory actions taken to reduce the effects of fishing activity on Steller sea lions include limitations on the incidental take of Steller sea lions in commercial fisheries, area and gear closures to protect principal rookeries and haulout areas, precautionary catch limits intended to leave more fish for marine mammals and other predators, seasonal apportionments of the total allowable catch to decrease the chance of localized depletion of prey, and a prohibition on the development of a commercial directed fishery for forage fish. But a 2000 minimum population estimate indicated that the western population of Steller sea lions has continued to decline despite these restrictions. That population numbered about 34,600 sea lions in 2000, compared to 170,000-180,000 sea lions in the 1960s (NMFS 2001b).

The cause(s) of the continued decline of the western stock has been the subject of intense controversy in the past several years, with proposed explanations generally falling under one or more of the following four hypotheses:

- The regime shift hypothesis, which argues that large-scale changes in ocean climate alter the amount and distribution of productivity in ways that affect the availability of forage fish for Steller sea lions;
- The junk food hypothesis, which is an extension of the regime shift hypothesis, and argues specifically that a regime shift has led to a significant decrease in capelin and other high-lipid prey and an increase in pollock and other less nutritious prey for Steller sea lions;
- The predation hypothesis which argues that the removal of large numbers of whales from the North Pacific by whaling fleets in the decades before whaling ended in the late 1970s removed the prey for offshore populations of killer whales, which have now moved inshore and are feeding on sea otters, Steller sea lions, and other marine mammals; and

- The localized depletion hypothesis, which argues that the pollock fishery (and the Atka mackerel and cod fisheries) causes localized depressions in the prey field around Steller sea lion rookeries, haulouts, and other critical habitat.

There is some evidence for each of these hypotheses, reviewed in NRC (1996) and NMFS (2001a, d), but the evidence is either incomplete or inconsistent with other data (NMFS 2000a, 2001a). Thus, it is not possible at this point to state unequivocally that one hypothesis, or combination of hypotheses, should be favored over the others. In fact, the multispecies modeling study carried out by Trites *et al.* (1999) highlights the danger of putting too much weight on any single hypothesis, particularly relatively simple ones that depend on first-order effects.

Despite the lack of certain evidence for or against any of the four major hypotheses, the most recent biological opinion (NMFS 2001b) does restrict the spatial scope of any potential localized depletions, based on the results of recent telemetry studies that track the movement of Steller sea lions during foraging trips. The rapid evolution of knowledge about the relationships among pollock stocks, the pollock fishery, and Steller sea lions is reflected in the series of biological opinions produced by the NMFS over the last few years.

Biological opinions and consultations initiated by the NMFS in 1990, 1996, and 1997 under Section 7 of the ESA concluded that North Pacific groundfish fisheries and catch levels were unlikely to jeopardize the continued existence and recovery of the Steller sea lion or to adversely modify critical habitat (DiCosimo 1998a). The 1998 Biological Opinion concluded that, while there was "no jeopardy" for the Atka mackerel fishery, there was a jeopardy finding for pollock.

In 1999, a federal court ruled that the reasonable and prudent alternatives associated with the 1998 jeopardy finding were arbitrary and capricious because the NMFS failed to articulate a rational connection between the reasonable and prudent alternatives and how they avoided jeopardy (*AOC v. Daley*, 7 August 2000). The court ordered the agency to re-examine the issues in a more ecologically comprehensive way, and called for an expanded environmental impact statement with analysis of a broader array of alternatives than just alternate catch levels. Subsequent attempts by the NMFS to revise the Biological Opinion and reasonable and prudent alternatives for the fishery were rejected by the court, which finally granted an injunction in July 2000 to close the fishery in critical habitat areas.

The NMFS released the new court-ordered Biological Opinion in November 2000, concluding that the pollock fishery (as well as two other North Pacific fisheries) did indeed jeopardize the continued existence of Steller sea lions and adversely modify their critical habitat due to competition for prey and modification of their prey field. The Biological Opinion included recommended reasonable and prudent alternatives to mitigate these effects. In December 2000, the federal district court lifted the injunction barring trawl fishing in critical habitat areas.

Based on the finding of its Scientific and Statistical Committee that the 2000 Biological Opinion was "scientifically deficient," the North Pacific Council rejected the conclusion that the fishery was the cause of the sea lion decline, and disagreed with the associated reasonable and prudent alternatives (NMFS 2001b). The measures associated with the opinion were considered so

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"sweeping" by members of the fishing industry that they sought congressional action to delay implementation of the alternatives (Seattle PI article 1/13/01).

Consequently, a congressional "rider," an addendum to an appropriations bill, was negotiated between Senator Ted Stevens and the White House to provide support for scientific studies, to delay imposition of the reasonable and prudent alternatives for one year, and to prescribe that any reasonable and prudent alternatives would have to be reviewed and implemented via the regional council process in the course of fishery management planning, rather than imposed by the consulting agency.

The Council proposed a suite of Steller sea lion protection measures as alternatives for analysis in a June 2001 Supplemental Environmental Impact Statement. The NMFS considered the majority recommendation (identified as Alternative #4 in the Supplemental Environmental Impact Statement) as the Council's preferred alternative, for purposes of initiating formal consultation under Section 7 of the ESA (67 FR 5:956-1024).

Informal consultations between the fisheries and protected species divisions of the NMFS concluded that all other listed species occurring in Alaska other than Steller sea lions would not be adversely affected by the implementation of actions recommended under the preferred alternative. Therefore, only the endangered and threatened populations of Steller sea lions were the subject of the formal consultation and draft Biological Opinion issued by the agency in August 2001 (67 FR 5:956-1024).

The 2001 Biological Opinion determined that Alternative #4 met the requirements of the ESA by avoiding the likelihood of jeopardy to Steller sea lions and adverse modification of their critical habitat. In a review of the draft Supplemental Environmental Impact Statement and 2001 Biological Opinion in September 2001, the Council identified Alternative #4 (with several modifications) as its preliminary preferred alternative. Although several other alternatives were considered to have similar or less adverse effects on Steller sea lions, Alternative #4 was approved by the NMFS as meeting both the ESA's "no jeopardy" requirement and the goals of the M-SFCMA (67 FR 5:956-1024).

The final 2001 Biological Opinion issued in October of that year, after consideration of public comments, concluded that the contribution of the groundfish fisheries to the Steller sea lion decline was likely to be small under the protection measures proposed in Alternative #4. The opinion maintained the earlier finding that these measures were not likely to jeopardize the continued existence of either the eastern or western populations of Steller sea lions, or to adversely modify their critical habitat (67 FR 5:956-1024).

New protection measures proposed by the North Pacific Council under Alternative #4, approved by the NMFS, and implemented in an emergency interim rule published in the Federal Register on January 8, 2002, intend to avoid fishery-related reductions in the abundance of Steller sea lion prey in key local foraging areas. Those affecting the directed pollock fisheries include (67 FR 5:956-1024):

- Area closures for federally permitted vessels fishing between zero and three nautical miles of 39 rookery sites;

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- A modified harvest control rule to prohibit directed fishing when pollock biomass reaches 20 percent of its unfished level;
- Closures within 10 or 20 nautical miles of selected haulout and rookery sites to directed fishing in the Gulf of Alaska and Bering Sea/Aleutian Islands;
- Closure of Seguam foraging area and most of the Bogoslof area to all gear types;
- A vessel monitoring system requirement;
- Closure of the Chignik area to pot, trawl and hook and line gears; and
- Modifications to the CDQ program.

Protection measures specific to pollock fishing in the Aleutian Islands area include closure of the subarea to directed fishing for pollock, and closure of the Seguam foraging area to pollock fishing by all gear types.

Protection measures specific to pollock fishing in the Bering Sea area include the establishment of two seasons (40:60 percent apportionment) for the pollock fishery with no more than 28 percent of the annual directed fishing allowance taken from the Steller sea lion conservation area before April 1, continuation of Bering Sea pollock fishery cooperatives established under the AFA, establishment of the Bering Sea Pollock Restriction Area during the A season, and closure of the Catcher Vessel Operation Area to non-CDQ pollock trawl catcher/processors during the B season.

Protection measures specific to pollock fishing in the Gulf of Alaska include distribution of pollock catch evenly over four seasons, closure of directed fishing for pollock in areas that vary from 0-20 nautical miles to 0-3 nautical miles around rookeries and haulouts, and continuation of the NMFS' Chiniak Gully research project to explore the effects of commercial fisheries on pollock abundance and distribution in the Gulf of Alaska.

These measures address competitive interactions between the groundfish fishery and Steller sea lions in several ways. First, modifying the existing harvest control rule will ensure that in the future enough prey resources exist overall and that prey densities are sufficient for Steller sea lions on a large scale. Second, distributing the catch of important prey species over zones of key importance to critical components of the Steller sea lion population and over time will reduce the effects of localized depletion (the reduction of prey resources to a level that decreases the efficiency of a foraging sea lion so that it adversely affects its health or increases its risk to predation).

Finally, prohibitions on fishing in areas immediately surrounding all rookery and many haulout sites and curtailing fishing for important prey species in significant portions of designated critical habitat will relieve competition in areas considered important to Steller sea lion survival and recovery (67 FR 5:956-1024). Figure 11 illustrates areas where pollock and Atka mackerel fishing is restricted following implementation of the emergency rule.

While the majority of these measures are in effect only through July 8, 2002, the NMFS intends to supersede this emergency interim rule implementing 2002 protection measures with proposed and final rulemaking to implement these or similar measures for the remainder of 2002 and beyond (67 FR 5:956-1024).

3.3.5.3.2 Northern fur seal status, science, and regulatory actions

Although the new regulations implemented by fishery managers to protect the Steller sea lion were not deemed to pose a threat to any other listed species, there is concern about possible effects on the northern fur seal, a depleted marine mammal. Nearly 75 percent of the world's northern fur seal population congregates around the Pribilof Islands during the four to six month breeding season. These animals spend the rest of the year in the North Pacific, migrating as far south as California, and west to the Okhotsk Sea and Honshu Island, Japan (Angliss *et al.* 2001).

The northern fur seal population, which is estimated based on pup production, was originally driven to low levels by the practice of harvesting females for pelts. The Alaska population recovered in the 1970s after this practice ceased, but decreased again in the 1980s. Pup production on St. George Island had also been decreasing since the late 1970s. And fur seals were designated as depleted under the MMPA in 1988, at which time the population was estimated at less than 50 percent of what had been observed in the 1950s. This designation means the northern fur seal is classified as a strategic stock, and incidental takes may not exceed a biologically determined level. In the case of fur seals, this level is defined as 17,905 animals (Angliss *et al.* 2001).

Pup production has been relatively stable on St. Paul Island over the last decade, but has generally continued to decline on St. George Island, with the exception of a slight increase in 1996. The current population is estimated at 983,918 animals (Angliss *et al.* 2001).

Six commercial fisheries that could have interacted with northern fur seals, including the Gulf of Alaska and Bering Sea groundfish trawl fisheries, were monitored between 1990 and 1999, with the only mortality occurring in the Bering Sea/Aleutian Islands groundfish trawl fishery. Over this nine-year observation period, the mean annual total mortality was 0.6 animals, or one animal per 1,862,573 mt of landed groundfish (NMFS 2001b). All sources of incidental mortality in fishing operations are considered insignificant (Angliss *et al.* 2001).

Habitat disturbance associated with the rapid development of a new processing plant, harbor basin, fuel tank farm, and other activities on the Pribilof Islands includes nearshore discharge of seafood processing waste, oil and contaminant spills, increased direct human disturbance, and increased levels of noise and olfactory pollution (Angliss *et al.* 2001). Other sources of mortality for fur seals include entanglement in marine debris, intentional killing by recreational or commercial fishermen, and subsistence takes.

Because northern fur seals use juvenile pollock as a prey species, the Supplemental Environmental Impact Statement analyzing Steller sea lion protection measures also evaluated the effect of the five proposed alternatives on northern fur seals, examining incidental take, entanglement in debris, fishery catch of prey species, spatial and temporal concentration of the fishery, and disturbance. The selected Alternative #4 was projected to have insignificant effects for fur seals in terms of incidental take or catch of their prey species, even though the timing of the fishery (from June to October) was expected to increase competition for prey species in fur

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seal foraging habitat (NMFS 2001b). Because the increased bycatch of small pollock during the breeding season is not expected to affect the fur seal population as a whole, the effect was determined to be insignificant.

Spatial and temporal concentration of the fishery under Alternative #4 was projected to have a conditionally significant negative effect on fur seals. This alternative expands the timing of the fishery from June to October, when fur seals are breeding on the Pribilof Islands. According to the Supplemental Environmental Impact Statement, "while this change slows the pace of the fishery it may also increase the likelihood of localized effects between foraging areas" (NMFS 2001b).

This is important for fur seals because studies have shown lactating females partition their foraging habitat according to their rookery areas, and that seals from one area do not forage with seals from another area (Robson 2001). The conclusion assumes that, if the Eastern Bering Sea fishery is displaced to protect Steller sea lion foraging areas, it will move into summer and fall foraging habitat of northern fur seals, where they would overlap with the fishery and perhaps compete for prey (NMFS 2001b).

3.3.6 Regulating the effects of fishing on habitat

3.3.6.1 Legal requirements

In addition to the ESA provision requiring the identification and protection of habitat determined to be critical to the survival and recovery of listed species (See Section 3.3.5.1; Appendix E), Section 303(a)(7) of the M-SFCMA, as amended October 11, 1996, requires that all federal fishery management plans describe and identify essential fish habitat for the fisheries they manage, that they minimize to the extent practicable the adverse effects on such habitat caused by fishing, and that they identify other actions to encourage the conservation and enhancement of such habitat. Essential fish habitat is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. Sec. 3(10)).

The Final Rule published by the NMFS on 17 January 2000 to implement the essential fish habitat provision interpreted this definition as follows (67 FR 12:2343):

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate;
- "Substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities;
- "Necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and
- "Spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle."

3.3.6.2 Managing habitat interactions

The North Pacific Council adopted a Habitat Policy Statement to guide its review of habitat issues as early as 1988. While most of the management measures taken by the Council over the years were intended to regulate the take of target, non-target, and protected species, and to allocate catch among competing user groups, many of those measures do provide indirect protections to habitat in the broader, ecosystem sense.

For example, the tightly controlled catch quotas described in Section 3.3.3 ensure that catches are maintained within biologically acceptable levels. The area closures and bycatch limits described in Section 3.3.5.2 minimize incidental catches and discards of non-target species. And the temporal and spatial catch allocations, as well as the prohibition on the development of a directed fishery for forage fish described in Section 3.3.5.3, reduce the potential impacts of localized depletion, and ensure that important prey species remain available to groundfish, seabirds, and marine mammals (NPFMC 1999c). But the M-SFCMA requires that fishery managers also take direct steps to minimize the adverse effects of fishing gear on habitat.

Though few studies have been conducted in the Alaska region, research conducted elsewhere indicates that several different types of fishing gear may impact the abundance and diversity of groundfish by altering, degrading, and/or destroying the habitats these and other fish depend upon for survival. For example, longline, and other types of hook and line gear, may disrupt rocks, coral, and other bottom structures important to groundfish survival. Pots (or traps), if dragged across the bottom when retrieved, can also damage benthic habitat. Finally, bottom trawls can destroy benthic organisms, damage complex habitats, and alter habitat sediment structure, in addition to smothering suspension feeders and harming larvae by suspending sediments (PFMC 2000). The National Research Council describes the current state of knowledge on the effects of bottom trawling on habitat in its March 2002 report titled *Effects of Trawling and Dredging on Seafloor Habitat*.[25]

The North Pacific Council has implemented several measures that serve to reduce the direct effects of fishing gear on habitat essential to the groundfish and other fisheries. For example, several areas of the Bering Sea and Gulf of Alaska have been closed to groundfish trawling and scallop dredging to reduce potential adverse impacts on king crabs and their habitat, as well as on other benthic organisms. The Council has prohibited the use of bottom trawl gear in the Bering Sea/Aleutian Islands directed pollock fishery. And additional restrictions regulate the size and number of dredges used in areas where scallop dredging is permitted (NPFMC 1999c).

In 1998, the NMFS was sued by a number of environmental and industry groups, including the American Oceans Campaign, the Ocean Conservancy, Oceana, the Natural Resources Defense Council, the Pacific Coast Federation of Fishermen's Associations, and the Cape Cod Commercial Hook Fishermen's Association, and others, for approving essential fish habitat amendments developed by five of the eight regional fishery management councils (including the North Pacific Council) that plaintiffs alleged failed 1) to adequately assess the effects of fishing and gear on marine habitat, 2) to adequately identify or assess potential measures to minimize

[25] The full text of this publication is available online at http://bob.nap.edu/books/0309083400/html/.

those effects, and 3) to implement practicable measures to minimize those effects (NPFMC 2002b).

The plaintiffs argued that the essential fish habitat amendments, as developed, were arbitrary, capricious and in violation of the M-SFCMA. Additionally, they claimed that the environmental assessments that accompanied the amendments contained an inadequate evaluation of the environmental effects of the proposed actions, that they lacked justification for the agency's findings of no significant impact and, consequently, that the agency's actions were also in violation of the NEPA (NPFMC 2002b).

On 14 September 2000, the U.S. District Court for the District of Columbia rejected the plaintiffs' charge that the North Pacific Council's essential fish habitat amendment violated the M-SFCMA. The court found that the Secretary was reasonable in concluding that 1) the amendment was in compliance with the Act, based on the limited amount of scientific information available at that time, and 2) additional protective measures were not needed, considering both the lack of scientific evidence and the protective measures that had already been adopted (NPFMC 2002b).

But the Court did agree that the NMFS did not meet the requirements of the NEPA and, consequently, that the agency was in violation of the Administrative Procedures Act. As a result, the Council and the agency were prohibited from enforcing the amendment until they prepared a new, more thorough, and legally adequate environmental analysis in compliance with NEPA requirements (NPFMC 2002b).

A settlement agreement finalized almost fifteen months later provides fishery managers with a plan and schedule to improve the analyses needed to effectively meet the essential fish habitat mandate. In particular, the agreement forces managers to more thoroughly examine the impacts of fishing gear on habitat and to re-evaluate management measures that can help to mitigate those impacts (World Catch 2001b).

The NMFS is currently preparing a Supplemental Environmental Impact Statement in accordance with the NEPA for the essential fish habitat components of the Alaska groundfish fisheries. Notification of preliminary alternative approaches for essential fish habitat and habitat areas of particular concern was published in the Federal Register on 10 January 2002 (67 FR 1325).

The Alaska Fisheries Science Center's Auke Bay Laboratory[26] and Resource Assessment and Conservation Engineering Division[27] are currently conducting research to improve scientists' understanding of the direct effects of bottom trawling on habitat and to learn more about life history-habitat associations that may be affected by fishing gear. Researchers are also evaluating technology to determine gear effects and benthic habitat features, and conducting retrospective analyses of spatial and temporal patterns of bottom trawling (NMFS 2002).

[26] See http://www.afsc.noaa.gov/abl/.
[27] See http://www.afsc.noaa.gov/race/default.htm.

The short-term focus of future research will concentrate on documenting the effects of various gear types, including trawls, longlines, pots, and dredges, on a wide range of habitat types, on mapping habitat, and on examining the associations between habitat features, fish utilization, and geological processes. Long-term research will attempt to establish connections between habitat and fish production and population dynamics, and to mitigate the effects of fishing through gear design (NMFS 2002).

3.3.7 Science and data

3.3.7.1 Stock assessment modeling

During the late 1970s and early 1980s, cohort analysis and virtual population analysis became widely used in groundfish assessments, and evolved into generalized catch-at-age models (Deriso *et al*. 1985; Quinn *et al*. 1985) and stock synthesis models (Methot 1991). The synthesis model was the standard groundfish assessment technique for the North Pacific through the mid-1990s (Trumble 1998). Subsequently, stock analysts developed unique variations for pollock (Ianelli *et al*. 2000; Dorn *et al*. 2000).

Currently, stock assessment modeling for the Eastern Bering Sea pollock incorporates catch and age data, bottom trawl data, and echo integration trawl data (Ianelli *et al*. 2000; Stokes 2000). It is considered to be of the highest standard (Stokes 2000) and uses state-of-the-art modeling techniques. In this regard it assures consistency and stability of advice and credibility in science and decision making. The Gulf of Alaska pollock assessment (Dorn *et al*. 2000) is similar to that of the Eastern Bering Sea. Both assessments are updated annually.

Assessment problems in this fishery relate to the poorly understood stock structure as a whole (Bailey *et al*. 1999) (See Sections 3.2.1.3 and 4.1.1.1). Apparently unique stocks and intermingling of the stocks makes attributing catch and catch impacts to the stocks difficult. Some genetic studies indicate low levels of genetic differentiation, while another indicates high variability in the Bering Sea and Gulf of Alaska. Seasonal timing of sample collection may have allowed fish of different populations to mix (Bailey *et al.* 1999), confounding the analysis. Currently, the NMFS is collaborating with scientists at the University of Washington to use microsatellite DNA methods to evaluate the genetic composition of pollock from various regions of the Bering Sea.

3.3.7.2 Data collection

While the stock assessment modeling for the Bering Sea and Gulf of Alaska pollock assessments is acknowledged as world class, any assessment is only as good as the data on which it is based. There exists a tradeoff between the quality of the data and the concomitant level of uncertainty in key information required for the assessment, and the expression of risk in the scientific advice. Poor data and higher uncertainty mean the risk of being wrong is greater, increasing the need for precaution in setting catch quotas and other management measures. It is therefore important that the evaluation team consider in detail the processes and procedures involved in data collection and the extent and quality of the resulting data that feed into stock assessment models.

Age-length data and catch composition are derived from mandatory observer coverage of vessels greater than 60 feet in length (See Section 3.3.7.2.1.2). Age sampling results in a coefficient of variation on the catch-age reconstructions of approximately ten percent, greater than the five percent target, but excellent compared to most catch-age analyses. But there are some problems with the data collection, which are outlined in more detail in the following sections.

3.3.7.2.1 Fishery-dependent data

3.3.7.2.1.1 Catch reporting

All landings are reported, until 1986 through fish tickets, which now serve as a backup for other reporting methods. In 1986, all catcher-processor vessels and motherships were required to report their total catch to the NMFS via radio on a weekly basis. This system continued to 1990, when all processors, both at-sea and onshore, were required to report weekly totals, coinciding with the onset of observer coverage. Radio reports were replaced with faxed reports, email, and, eventually, with instant electronic reporting. Now the catcher-processor fleet reports catches daily and is voluntarily carrying vessel monitoring system units aboard each of its vessels. Regulations will take effect in June 2002 requiring all vessels fishing for cod, pollock, or Atka mackerel to carry vessel monitoring system units. All catches are weighed and counted against the total allowable catch quota.

3.3.7.2.1.2 Observer data

The use of observers on American fishing vessels began in the 1980s as programs developed to meet specific regional needs. The MMPA provides the authority to place observers on fishing vessels if a fishing operation interacts with marine mammals. Such authority is provided by the ESA if fishery management actions require monitoring as part of an incidental take statement or reasonable and prudent alternatives. The M-SFCMA also provides general authority to place observers on fishing vessels in federal waters. In 2001, there were more than 500 observers operating in 15 fisheries, with generally low levels of coverage except in the North Pacific. See Table 12 (Cornish 2001).

The fishing industry covers the $7,000,000 cost of the North Pacific's observer program, which collects data on the age and size composition of landed catch, as well as on incidental catches and discards, and protected species interactions. Current requirements for North Pacific groundfish vessels and shoreside processing facilities are detailed in Table 13. In essence, pollock vessels have the following coverage requirements:

- Vessels 125 feet (38.1 meters) in length overall or longer must carry at least one National Marine Fisheries Service-certified observer on 100 percent of their sea days;
- Vessels equal to or greater than 60 feet (18.3 meters) in length overall, but less than 125 feet (38.1 meters) in length overall, must carry a National Marine Fisheries Service-certified observer during at least 30 percent of their fishing days; and
- Vessels less than 60 feet in length overall are not required to carry observers.

In addition to this coverage, due to the strict requirements to monitor specific quotas by the CDQ group, each catcher-processor vessel fishing under a CDQ must have motion compensated flow scales, two observers aboard to monitor 100 percent of fishing effort, and a sampling station. Observers also are required to have a minimum of 60 days prior experience and additional training. Vessels operating under the provisions of the AFA have observer requirements that are similar to those operating under the CDQ program, including 100-200 percent observer coverage in the Bering Sea.

3.3.7.2.1.3 Social and economic data

Commentators upon the fishery management system often point out that the system manages people, not fish (Mangel *et al.* 1996). In truth, many of the day-to-day regulatory challenges involve allocating catch among competing user groups who depend upon the fishery for their livelihood. The M-SFCMA recognizes this by providing fishery managers with multiple directives to assess the social, cultural, and economic status and impacts of fisheries. Social and economic data and analyses are needed to satisfy other legal requirements as well, such as those provided by the Small Business Act, NEPA, the Regulatory Flexibility Act (RFA), and Executive Order 12866: Regulatory Planning and Review. Appendix E details the requirements of these provisions.

The NMFS and several state agencies, including the Alaska Department of Fish and Game, the Department of Community and Regional Affairs, the Department of Labor, and the Department of Commerce and Economic Development, gather the data needed to meet these legal requirements. This includes data on vessels, catches, markets, participants, companies, and communities. And social scientists at the NMFS, three economists on staff at the North Pacific Council, scientific advisers, and, sometimes, independent contractors, assist in incorporating these data into the decision making process.

But it is generally widely accepted that the social, cultural, and economic aspects of fisheries and fishery management are not adequately assessed. Data deficiencies are attributed to inadequate funding for data collection and also to laws that prohibit the collection of proprietary information. In addition, the NMFS has an inadequate number of social scientists on staff to conduct impact analyses. And many important aspects such as non-market, non-use, cultural, aesthetic, and existence values are difficult to quantify (The Heinz Center 2000a).

Even so, substantial new information and profiles of fishing communities, participants, and economic returns, included in the Supplemental Environmental Impact Statement prepared for the Alaskan groundfish fisheries by Northern Economics, have improved our understanding of the human component of Alaska groundfish fisheries. And the Draft Programmatic Supplemental Environmental Impact Statement published in January 2001 (even though it has been pulled back to respond to extensive comments) has provided more detail than heretofore available on participants in the fisheries, the impact of fishing employment and income on communities, and the economic contribution of the various groundfish sectors.

3.3.7.2.2 Fishery-independent data

Surveys of demersal resources in the northeast Pacific began in the 1940s with U.S. Fish and Wildlife trawl surveys of the Bering Sea to evaluate king crab resources (Alverson *et al*. 1964). Over the next 20 years, standardized bottom trawl surveys expanded from the Chukchi Sea to waters off southern Oregon, and focused on measuring distribution and relative abundance rather than absolute abundance.

The bottom trawl survey continues to be a primary means of gathering abundance and biological data for pollock and other groundfish. The NMFS has conducted annual Bering Sea surveys on the eastern continental shelf since 1971, and triennial surveys of the outer continental shelf and upper slope since 1979 (Trumble 1998). The Eastern Bering Sea consists of a smooth, flat shelf averaging 740 km wide, and is sampled without roller gear. The rough-bottomed 39 km wide slope is sampled with roller gear.

Triennial surveys of the Gulf of Alaska began in 1984. The Gulf of Alaska has a 5-100 km wide continental shelf with many rough, foul bottom areas difficult to trawl. The untrawlable areas add uncertainty to the biological information collected, to the degree that pollock in the untrawlable areas differ from other pollock.

The Eastern Bering Sea bottom trawl survey is neither random nor stratified, but consists of a well-established standard grid of survey stations sampled using bottom trawl tows with the net on the bottom for 30 minutes. The trawl is a low headrope design used primarily for flatfish. The assessment diagnostics indicate that the survey indices of abundance are good in spite of the semi-pelagic behavior of pollock (Stokes 2000). But the trawl surveys are limited by lack of areal coverage (NPFMC 1999). Budgets and logistics prevent trawl surveys in waters deeper than about 200 fathoms. Portions of deep-water stocks – arrowtooth flounder, Greenland turbot, sablefish, Pacific Ocean perch, and pollock – are not fully sampled. The lack of coverage is partially offset by the detail available from the trawl surveys. The surveys provide an independent estimate of fishery conditions, which are often less biased than fishery-dependent estimates.

From 1984 to 2000, the NMFS' Alaska Fisheries Science Center conducted trawl surveys every three years to assess the abundance of groundfish in the Gulf of Alaska. The frequency of these surveys was increased to every two years beginning in 2001. The survey uses a stratified random design, with 49 strata based on depth, habitat, and management area (Martin 1997). The Alaska Department of Fish and Game has also conducted bottom trawl surveys of nearshore areas of the Gulf of Alaska since 1987. Although designed to monitor population trends of Tanner crab and red king crab, these surveys also sample walleye pollock and other fish. The survey is designed to sample a fixed number of stations from mostly nearshore areas from Kodiak Island to Unimak Pass, and does not cover the entire shelf area (see Blackburn and Pengilly (1994) for details).

The NMFS trawl survey is a multi-purpose survey, with lower than optimal coverage for pollock in nearshore areas that are intensively sampled by the Alaska Department of Fish and Game survey. National Marine Fisheries Service scientists are exploring various methods of integrating state survey data into the stock assessment. Preliminary results suggest that nearshore areas are not being adequately surveyed during the NMFS' bottom trawl survey, but there are many issues

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yet to be resolved. Since the NMFS time series begins in 1984, prior to the start of the state survey, obtaining a consistent time series of biomass estimates for population modeling may not be possible (Dorn *et al*. 2001).

Whereas bottom trawl surveys assess pollock from the bottom to the three-meter layer of the water column, echo-integration trawl surveys have been used to estimate the abundance of pollock in midwater. In the Eastern Bering Sea, echo-integration trawl surveys have been conducted approximately triennially since 1979 (Traynor and Nelson 1985). During the last decade, six echo-integration trawl summer surveys have been conducted in 1991, 1994, 1996, 1997, 1999, and 2000. In 2000 and 2001, the NMFS conducted winter echo-integration trawl surveys on the Eastern Bering Sea shelf region in addition to the Bogoslof Island region. Echo-integration trawl surveys to assess the biomass of pollock in the Shelikof Strait area have been conducted annually since 1981 (except 1982 and 1999).

In essence, the Eastern Bering Sea echo-integration surveys provide good data for midwater pollock above the range of the bottom trawl. Rather than combining these data with those from bottom trawl surveys to produce a single fishery-independent biomass estimate, the data are used independently as separate relative abundance indices within the population model.

4 ISSUES AND ANALYSIS

4.1 Principle 1: Managing exploitation of target species

Principle 1: A fishery must be conducted in a manner that does not lead to overfishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Section 3.2.1 demonstrates that scientists understand a great deal about the biology and life history of walleye pollock. Thus, in terms of the information needed for traditional, single-species stock management, this fishery is relatively well positioned. The stock assessment modeling described in Section 3.3.7.1 is state-of-the-art. And the conservative exploitation strategy detailed in Section 3.3.4.2 provides fishery managers flexibility to adapt to new information as it becomes available. As a result, this fishery management system has been effective in maintaining its target species at sustainable levels. A summary of stock status and trends is provided in Section 3.3.4.3.

One issue for the evaluation team to consider under this principle relates to current uncertainties about the structure of walleye pollock stocks, and about catches and management in Russian waters (See Section 4.1.1.1). A second issue relates to the use of (or lack of use in the Gulf of Alaska) probability analyses to predict the likelihood that fishing mortality and spawning stock biomass will be maintained within threshold levels under various catch scenarios (See Section 4.1.1.2). The potential implications of the absence of an internationally adopted management strategy for the Donut Hole will also be an issue should fishing be resumed in that area in the future (See Section 4.1.2.2).

As described in the following sections, U.S. fishery managers have generally recognized and responded to the above-identified issues in a conservative way, building precautions into the management system to buffer against the potential impacts of unknowns. Consequently, none of these issues should be considered a major concern or red flag, but rather an area where management could be improved with additional information or analysis.

4.1.1 The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity

There are three important questions for certifiers relevant to this criterion. First, does the management system accept the criterion? Second, if a strategy to achieve the criterion is adopted, does it work on the ground? And, third, can it be enforced?

National Standard 1 of the M-SFCMA requires that "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry" (16 U.S.C. 1851). The term "optimum" is defined as "the amount of fish which a) will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; b) is prescribed as such on the basis of maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery (16 U.S.C. 1802(28)).

The NMFS has interpreted this to mean that maximum sustainable yield is the upper bound on fishing mortality (63 FR 24212; NMFS 1997). The fact that this standard is enforceable in the courts by citizen suits actually reinforces the system. In the North Pacific walleye pollock fisheries, the standard has been implemented by setting the fishing mortality rate at a level that is projected to maintain the spawning stock biomass at a size that is capable of producing at least 75 percent of the maximum sustainable yield (See Section 3.3.4.2).

4.1.1.1 Knowledge of target stocks

Intensive studies dating back more than 20 years have provided fishery scientists and managers with valuable information on the biology and life history of walleye pollock. Extensive and fishery-independent length, weight, and age data exist for this species, as do fishery-dependent catch statistics verified by observer data.

The uncertainties about stock structure described in Section 3.2.1.3 represent the one major unknown currently recognized by fishery scientists (Ianelli *et al.* 2000). The definition and extent of separation of pollock stocks within the U.S. management area will be a topic of interest for the evaluation team. There are several issues to consider in this context.

On the one hand, there is the "real" distribution of unit stocks and other sub-units within the overall distribution of the target stock, the basic characteristics of these stocks and sub-units, and the dynamics of the interactions between them. On the other hand, there is the model of stock

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structure that is adopted for practical assessment and management purposes, which almost certainly represents a simplification of the real world. Finally, there is the risk to the target stock and wider ecosystem posed by the adopted management approach. There will undoubtedly be differences between the real stock dynamics and the version assumed for management purposes. But do these differences pose a threat to the achievement of management objectives, or do they err on the side of caution?

In general, if there is uncertainty whether a population in a given geographic area is a single stock, but there is evidence of putative "sub-units," then the precautionary approach is to manage those sub-units separately, each in a sustainable manner. This is because managing the aggregate of the sub-units as a single stock can hide the overfishing of a particular sub-unit (Daan 1991) (see Section 4.1.1.1.2). So in the North Pacific it is of relatively lower concern at present, at least in terms of immediate risks to sustainability, whether the Eastern Bering Sea and Aleutian Islands management units are separate stocks, since they are assessed separately, but both in a relatively precautionary manner.

As of the 2000 assessment by the NMFS, the assumed Eastern Bering Sea stock was not overfished, nor approaching an overfished condition (Ianelli *et al.* 2000). It is currently not possible to determine whether the Aleutian stock is overfished or approaching an overfished condition, due to lack of information. But determination of the level of acceptable biological catch is done on a very precautionary basis (see Section 3.3.4.2).

4.1.1.1.1 Transboundary movement

Eastern or western Bering Sea pollock that migrate across or around the Aleutian basin may be fished on both sides of the Bering Sea, thereby experiencing two independent sources of fishing mortality. The extent of exchange between pollock populations in the eastern and western parts of the Bering Sea is of some concern because of the uncertainty about both the condition of the western stock and compliance with management and reporting requirements. Alexey Vaisman has reported incidences of poaching and underreporting of pollock catches in the western Bering Sea (Vaisman 2001). And Russian Prime Minister Mikhail Kasyanov noted that continued poaching remains a serious problem in Russian fisheries (World Catch 2001a).

Catches within Russian waters might cause a reduction in the exploitable biomass and yield of populations within U.S. waters if those catches are composed of a significant number of juvenile pollock that would have recruited to the Eastern Bering Sea exploitable population. The historic level of fishing within the Navarin area (Figure 7) does not appear to have had an adverse impact on the Eastern Bering Sea stock. But the Eastern Bering Sea stock had been at high levels and then decreased to lower levels in recent years (Pautzke 1997). It is possible that the Eastern Bering Sea stock could be impacted at lower stock levels by current fishing practices in the Russian Exclusive Economic Zone.

Uncertainty over the extent of interchange between the eastern and western Bering seas makes it difficult to determine whether fishing in the Russian zone has caused the eastern stock to decline, or whether the eastern stock is perhaps more vulnerable, or both. The pollock catch in the western Bering Sea has declined recently due to overfishing. Unless there is a substantial change (increase) in the movement of pollock from the Eastern Bering Sea to the western Bering Sea,

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the current level of catch in the western Bering sea is unlikely to have an effect on the Eastern Bering Sea stock. In essence, while it is not a desirable indicator, the decline of the fisheries in the western Bering Sea while the Eastern Bering Sea fishery remains healthy is an indication of stock separation (see discussion of fishing effects on genetic structure below in Section 4.1.3).

Consequently, it is important for the evaluation team to consider the way in which the walleye pollock fishery is managed in Russian waters, and the extent to which this is taken into account in the assessment of total allowable catch quotas and other management measures established for the U.S. fishery. Similar questions caused the U.S. Congress in 1996 to task the North Pacific Council with preparing a report that describes the institutional structures in Russia pertaining to stock assessment, management, and enforcement for fishery catches in the Bering Sea, and that provides recommendations for improving coordination between the United States and Russia. The resulting report (Pautzke 1997) contains important information on the assessment and management of pollock in Russian waters.

Pautzke (1997) reports on differing opinions regarding the extent of interchanges between pollock populations off Cape Navarin and those in the U.S. Exclusive Economic Zone. In the past, regional Russian scientists have expressed the opinion that pollock from the Eastern Bering Sea make a significant contribution to the western Bering Sea (Fedeyev 1990; Shuntov *et al.* 1993). But they also believe that Eastern Bering Sea pollock move to the southeast Bering Sea upon reaching maturity and that the majority of large pollock captured in the northern Bering Sea (along the Convention Line) are of western Bering Sea origin (See Figure 7). Russian scientists believe that the target exploitation rate of 30 percent will prevent overfishing of the Eastern Bering Sea stock.

Wespestad (personal communication to Pautzke 1996) does not believe these assumptions are supportable. Aging techniques have been inadequate and there is a lack of clear distinction in year-class structure within the Bering Sea. Kotenev, deputy director of the Russia's Institute of Marine Fisheries and Ocean Studies in Moscow, has stated on two occasions[28] that he believes there are no Eastern Bering Sea pollock stocks intermingling with Russian stocks off Cape Navarin.

Despite these uncertainties, the precautionary approach suggests that the United States explicitly establish a management regime based on a hypothesis that fisheries in the Russian zone are at times catching pollock that have migrated west from the Eastern Bering Sea stock targeted by U.S. vessels. For example, for some years, a Russian and third party fishery has been concentrated in the northern Bering Sea just to the west of the Convention Line, and Pautzke (1997) also cites concerns over a Russian fishery off Cape Navarin that may be catching juvenile pollock from the Eastern Bering Sea stock.

The declining abundance of pollock in the Russian zone calls for catch restrictions to keep removals compatible with the productivity of the resource. If the Russian pollock management allows fishing above appropriate levels, the U.S. portion of the pollock resource could suffer. Migration of juvenile, and potentially adult, pollock from the U.S. zone to the Russian zone

[28] Personal communication to Pautzke 1997, and at the 12-13 August 1997 U.S.-Russian Bering Sea negotiating session in Washington, DC.

could put U.S.-origin pollock in jeopardy. Large Russian catches in a time of low abundance could increase the absolute amount of U.S.-origin pollock caught in Russia. Such a change in catch patterns would diminish the abundance of juvenile pollock available to migrate back to the U.S. zone. The pollock abundance in the United States could decline below levels that supported historical landings, and would require U.S. managers to significantly reduce the total allowable catch of the U.S. fishery (Pautzke 1997).

4.1.1.1.2 Donut Hole

In principle, source-sink movements of fish are less of a concern than seasonal migrations, at least from the standpoint of sustainability of the target stock. If movements to the Donut Hole are genuinely one-way overspills of adults which subsequently do not contribute to the spawning stock of the population from which they originated, they can be considered to be “surplus” fish, and could be fished intensively without affecting the source population (Wespestad 1993). But two main concerns remain regarding the spillover theories for the Donut Hole.

First, most of the support for the source-sink concept in the Aleutian Basin comes from fragmented and or anecdotal observations (Bailey *et al.* 1999), and these “spillover” theories have been contested. While juveniles are believed to be rare in the Aleutian Basin (Mulligan *et al.* 1989), spawning is known to occur in the central and southeastern parts of the basin (Hinckley 1987; Sasaki 1988; Mulligan *et al.* 1989).

Pollock in the Aleutian Basin are also known to have different length-at-age and fecundity characteristics compared to the fish on the shelf, suggesting they could come from separate spawning populations. Shuntov (1992) and Dawson (1994) have suggested that large numbers of pollock make seasonal feeding migrations from the eastern and western Bering Sea shelves to the Aleutian Basin, so they could not be considered as a sink.

Second, the idea of intensively fishing a spillover population takes into account only the effects on the target stock. Intense fishing may still have adverse effects on bycatch species, and on those species dependent on pollock and non-target species as a source of food.

Another, and perhaps more critical, question for the Eastern Bering Sea management unit is whether the fish concentrations in this area constitute a single homogenous stock, or a heterogenous collection of sub-populations. The concern in this case is that, when several genetically or geographically discrete sub-populations are grouped together within a single management unit, fishing mortality may be poorly estimated. This, in turn, could lead to inaccurate management advice and the risk of inadvertent overfishing on one or more of the sub- stocks (Daan 1991). This is particularly important in the Eastern Bering Sea where there are inter-annual fluctuations in the operation of the fishery in time and space.

4.1.1.2 Reference points

The MSC criteria call for definition of an exploitation strategy set with precautionary reference points (Principle 1, Criterion 1, Indicator 1.1.1.2). Fishery managers can use probability analyses to predict the likelihood that fishing mortality and spawning stock biomass will be maintained

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within threshold levels under various catch scenarios. Such analyses have been conducted for the Bering Sea fishery, but to a lesser extent for the Gulf of Alaska fishery.

The conservative, tiered approach used by the North Pacific Council to develop catch specifications for walleye pollock and other species is described in Section 3.3.4.2 and Appendix D. Pollock qualifies for Tier 1 management, the least conservative of the five tiers, which the Council uses to set the acceptable biological catch level. But the Council sets the total allowable catch level using the Tier 3 control rule.

The 2001 stock assessment for the Gulf of Alaska (Dorn *et al*. 2001) demonstrated the benefits of this more conservative approach. Low catch rates in the 2001 Gulf of Alaska trawl surveys led to biomass estimates smaller than predicted, and the 2001 assessment showed that the fishery would have exceeded the overfishing rate had total allowable catch been set equal to acceptable biological catch. In response, Dorn *et al.* (2001) proposed a new approach that increases the buffer between acceptable biological catch and total allowable catch at low biomass levels.

Pollock recruitment in recent years has been below average (though highly uncertain) in the Eastern Bering Sea, and short-term projections predict that the mean spawning stock is likely to drop below the $B_{40\%}$ and B_{MSY} levels if fishing occurs at the maximum allowable fishing mortality to set the acceptable biological catch (Ianelli *et al.* 2001). Projections through 2014 predict that mean spawning stock will increase to levels above $B_{40\%}$ and B_{MSY}. Such fluctuations are expected as a result of natural variability. But the mean biomass level does not address the full uncertainty of projected abundance trends.

Ianelli *et al.* (2001) present a cumulative probability analysis for a constant catch of 1,3000,000 mt that predicts that the 2001 abundance will be approximately 140 percent of $B_{40\%}$, with less than a 5 percent probability that abundance will fall below $B_{40\%}$. The analysis predicts that 2003 abundance will exceed 150 percent of $B_{40\%}$, with about a 25 percent chance of falling below $B_{40\%}$. For 2006, the analysis predicts an abundance about equal to $B_{40\%}$, with about a 50 percent chance of falling below that level. The annual management conducted by the North Pacific Council reduces the apparently higher future risk, as the Council annually sets the total allowable catch based on conservative interpretation of reference points.

Ianelli *et al.* (2001) make long-term projections though 2014 at two levels of fishing mortality. At $F_{40\%}$ (the maximum allowable fishing mortality for setting the acceptable biological catch), spawning biomass drops below $B_{40\%}$ and B_{MSY} for a few years. The lower bound of the 95 percent confidence interval stays well below $B_{35\%}$ for the entire projection, indicating that at least a modest probability exists that the actual abundance will fall below $B_{40\%}$. At a more conservative fishing mortality of the most recent five-year average F, the mean spawning biomass does not drop below $B_{40\%}$ at any time in the projection. The lower 95 percent confidence interval approaches $B_{35\%}$ for the entire projection, indicating a lower probability than under $F_{40\%}$ that the actual abundance will fall below $B_{40\%}$.

Dorn *et al.* (2001) provided a preliminary assessment of the probability of exceeding the overfishing level established for the Gulf of Alaska fishery, by sampling from the joint marginal likelihood of spawning biomass and fishing mortality in 2002 using a Markov Chain Monte

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Carlo. Analysis of the thinned Markov Chain Monte Carlo suggests that a one-sided confidence region bounded by the current overfishing level definition would be 65 percent if 2002 catch equalled the maximum permissible acceptable biological catch, and 81 percent if the 2002 catch equalled the author's acceptable biological catch recommendation (Dorn *et al.* 2001).

If the catch in 2002 is the same as the authors' recommendation (53,490 mt), there is a 19 percent (i.e., 100-81) chance of exceeding the overfishing level, and a 35 percent chance of exceeding the overfishing level at the maximum fishing rate for 2002. While there is a 19-35 percent probability of exceeding the overfishing level for 2002, an overfishing level of F_{MSY} is conservative, and the use of $F_{40\%}$ as an estimate of F_{MSY} is even more conservative.

While the risk of exceeding the overfishing level in one or two years does not cause much concern for a stock above minimum biomass thresholds, continued fishing above the overfishing level could drive the stock below threshold values. Dorn *et al.* (2001) did not present probabilities of exceeding the overfishing level or of reducing spawning biomass below threshold values over a longer period (for example, the generation time of the pollock resource).

4.1.2 Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term yields within a specified time frame

4.1.2.1 Response to overfishing in U.S. fisheries

As described in Section 3.3.4.3, the Eastern Bering Sea and Gulf of Alaska pollock stocks are neither overfished, nor are they experiencing overfishing. Managers have adopted very low, precautionary total allowable catch quotas for the Aleutian Islands and Bogoslof area fisheries because they are at low levels of abundance. And the United States supports the moratorium on the Donut Hole pollock fishery.

Two groundfish species, Pacific Ocean perch and yellowfin sole, have experienced major overfishing over the course of fishing in Alaska waters. This overfishing occurred during the foreign fishing era. The North Pacific Council had no authority over these species at that time. In fact, the Council did not yet exist. But it subsequently developed a rebuilding program to recover these overfished species. This response to the overfishing of Pacific Ocean perch and yellowfin sole may suggest the type of approach the Council would take should pollock ever become overfished.

Pacific Ocean perch is common in the Gulf of Alaska and Bering Sea, and characterized by a long life span (maximum age of 90 years) and low productivity. This species was severely overfished by Japanese and Soviet fleets in the 1960s. Catches from the Gulf of Alaska increased from virtually zero in 1960 to 350,000 mt in 1965, then declined to around 50,000 mt by 1970 (Heifetz *et al*. 2000). Bering Sea/Aleutian Islands catches showed a similar pattern. The Bering Sea catch peaked at 47,000 mt in 1961; the Aleutian Islands catch, at 109,100 mt in 1965.

The North Pacific Council set conservative catch limits and closed directed catch well below the limits to allow for the incidental catch of Pacific Ocean perch in other fisheries (Heifetz *et al.*

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2000). Observer data were used to account for discards. And, over time, the Pacific Ocean perch population recovered. Currently, Pacific Ocean perch in the Bering Sea/Aleutian Islands and Gulf of Alaska are neither overfished, nor are they approaching an overfished condition (Spencer *et al*. 2000). Annual landings of this species are about 15,000 mt for the Gulf of Alaska, 2,000 mt for the Bering Sea, and 10,000 mt for the Aleutian Islands.

Foreign fisheries also overfished yellowfin sole in the Bering Sea during the period 1959 to 1962. Landings dropped from an annual average of 404,000 mt in the late 1950s/early 1960s to an annual average of 50,700 mt through the 1970s (Wilderbuer and Nichol 2000). Since domestic fishing displaced foreign fishing, yellowfin sole and other flatfish have been less desirable than roundfish species. The Council set total allowable catch far below the acceptable biological catch to assure that total landings from the Bering Sea did not exceed the optimum yield. And actual yellowfin sole landings are generally less than the total allowable catch. The 2000 catch represents only 29 percent of the acceptable biological catch and 45 percent of the total allowable catch. Currently, the yellowfin sole is neither overfished, nor is it approaching an overfished condition (Wilderbuer and Nichol 2000).

While neither yellowfin sole nor Pacific Ocean perch is as commercially desirable or abundant as pollock, the recovery of these species demonstrates the conservative approach to fishery management adopted by the North Pacific Council. As previously stated in Section 4.1.1.2, the Council determines the total allowable catch quota for pollock using the Tier 3 control rule, even though adequate information exists to manage pollock as a Tier 1 species. In both cases, the catch rate would decline if the biomass continued to decrease until the biomass reaches a threshold at which the acceptable biological catch equals zero.

Both the Aleutian Islands and the Aleutian Basin pollock stocks are at lower than desired levels. In both cases, the North Pacific Council has set the total allowable catch quota substantially below the acceptable biological catch level (NMFS 2001e).

4.1.2.2 Response to overfishing in the Donut Hole

Pollock stocks have not been restored to the Donut Hole, despite a moratorium on fishing, which has been in place for almost a decade. This indicates that other factors, perhaps predator-prey interactions or oceanographic variables, are affecting the recovery of pollock in this area (Pollock Workshop 2000). A study by Hutchings (2000) reports that, in contrast to the popular perception that marine fishes are highly resilient to large population reductions, many species show little evidence for rapid recovery from prolonged declines.

U.S. fishery managers note that recovering pollock in the Donut Hole will require 1) adequate spawning biomass, 2) good oceanographic conditions, and 3) a reappearance of the pelagic pollock type. What constitutes the first and second items are not known. The Donut Hole stock may currently have a lower probability of returning to pre-harvest abundance than it did during pre-harvest years. U.S. managers hypothesize that Donut Hole pollock occur as a spillover from strong year classes on the continental shelf, consistent with the observation that few of the fish in that area are less than five years of age. Pollock fishing on the shelf will reduce the density of pollock ages five and older, and thereby reduce the probability of year classes that are large enough to result in spillover.

Bailey *et al*. (1999) suggest three sources of pollock in the Donut Hole: 1) a separate stock, 2) stocks intermingling with the shelf populations, or 3) spillover of immigrants from strong cohorts. The Russian Party (2000b) believes that pollock from the Russian zone normally contribute to the Donut Hole, but that little or no offshore movement of pollock from the Russian zone will occur at present or in the immediate future because of the low abundance of Russian pollock.

If pollock stocks in the Donut Hole recover to a level that allows fishing under Pollock Convention policies, a management strategy must be developed for the fisheries in the International Zone. The United States has proposed a management program for the Donut Hole fisheries. That program has received conceptual support. But the details are still under negotiation (personal communication, William Hines, National Marine Fisheries Service, Alaska Region). The proposal requires vessel monitoring systems for participating vessels, observers on vessels, a limitation on numbers of vessels, catches at or below specified catch rates, annual catch levels with individual national quotas, and shared catch data. Other countries will need to agree to a management program to assure precautionary fishing.

4.1.3 Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity

The removal of fish from a population by fishing affects the target species, as well as the ecosystem of which they are a part. The extent of these effects depends on a large number of factors, but the most important of these are the type and intensity of fishing (including exploitation rate), the biological characteristics of the fish (fecundity, growth rates, mortality rates, etc.) and the relationships between target species and dependent and related species. Fishing that targets a portion of the stock can change the demographics of that stock.

As the pollock fishery has matured, it has tended to concentrate more and more in time and space. This also has population, and possibly ecosystem level, consequences. In the Gulf of Alaska, the sea lion protection measures divide the annual pollock quota into four seasons and three large management areas to reduce the impact of fishing. These temporal and spatial allocations are based on the estimated seasonal distribution of biomass. While the goal of these measures is to reduce impacts on sea lions, other ecologically dependent species would also benefit (at least in theory). In addition, the measures would tend to conserve any sub-stock population structure that is not currently known (i.e., local spawning aggregations). A major study on the east side of Kodiak Island is currently examining whether management at this level is sufficient to prevent adverse effects of localized depletion on Gulf of Alaska fisheries. And there are plans to expand this study to the Eastern Bering Sea (Marin Dorn, personal communication, April 2002).

4.1.3.1 Age structure

Intensive fishing on pre-reproductive fish can reduce the reproductive success of a population by preventing enough fish from reaching spawning size or age. The extent to which reductions in numbers of spawning pollock affect the subsequent recruitment to the resource is one of the most important issues in the management of fisheries for sustainable catch and maintenance of ecosystem relationships. Recruitment overfishing occurs when spawning stock biomass is reduced below a threshold level that leaves too few fish to replace the population through natural reproduction.

High catch rates also tend to reduce the average age of fish populations. A shift in the age structure of the population towards younger fish could cause the reproductive success of the population to decline if the younger fish are not as successful at spawning as the older fish. Changes in mean age have been relatively slight compared to interannual variation in mean age for walleye pollock in the Gulf of Alaska (Marin Dorn, personal communication, April 2002). We recommend that the evaluation team examine whether the age structure of the Bering Sea stock has changed in response to fishing pressure.

The North Pacific Council and the NMFS restrict the allowable fishing to a conservative fishing rate (See Section 3.3.4.2). And monitoring by the observer program accounts for the total catch of all sizes of pollock. Thus, conservative management and full accounting of total catch reduce the probability that spawning biomass will fall below threshold values.

4.1.3.2 Sex composition

Female pollock are targeted for roe during the spawning season. In the extreme, targeting female pollock could seriously reduce the spawning potential of the resource. But male and female pollock mix during the spawning season, which reduces the probability that higher harvest rates would occur on females than on males. And, at other times of the year, female pollock have no special value. The North Pacific Groundfish Observer Program collects data on sex composition from the entire pollock catch (before sorting by the fishing crew occurs) so that the NMFS can monitor the sex ratios of the resource. Data do not suggest that changes in sex ratio have occurred.

4.1.3.3 Genetic structure

The U.S. system of assessing and managing pollock on a stock-specific basis reduces the probability that distinct genetic units would suffer overfishing even as the total resource experiences conservative fishing. But if distinct genetic units were smaller than fishery management units, then the genetic composition of North Pacific pollock could experience adverse changes. The relatively small size of the management units and the lack of data to suggest small-scale genetic distinctions keep this probability small.

The most danger to adverse demographic changes comes from pollock fishing in the Russian zone, where compliance with Russian management and monitoring of catches is uncertain. The Russian stocks and catches have declined in recent years. If fishery management in Russia should try to keep catches near current levels as abundance declines, fishing on juvenile pollock in Russian waters originating from the U.S. zone would likely increase.

Some Russians profess that separate Russian populations currently dominate the pollock resource in the Russian zone, and that U.S.-origin pollock contribute little to the Russian catch. To the degree that this assertion is true, Russian fisheries would have little effect on genetically- distinct U.S.-origin pollock. But, if the United States' (and some Russians') position that U.S.-

origin pollock contribute significantly to the Russian zone is true, Russian fisheries could impact U.S. origin pollock by removing pre-recruit pollock.

The U.S. catch strategy that requires a 2,000,000 mt optimum yield in the Bering Sea/Aleutian Islands area results in pollock catches that are far below a conservatively-set acceptable biological catch. This strategy, combined with the annual quota setting based on pollock biomass, minimizes the likelihood that Russian fisheries will adversely impact age, sex, or genetic composition of pollock in the U.S. zone. Enhanced data from the Russian zone made available to the U.S. analysts would help to assure that adverse impacts do not occur.

4.2 Principle 2: Managing ecosystem impacts

Principle 2: Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which fishery depends.

Section 3.2.3 summarizes what scientists know about the physical oceanography, environmental variability, and biological diversity of the Bering Sea/Aleutian Islands and Gulf of Alaska ecosystems. Section 3.3.5 describes the legal requirements for minimizing fishing-related impacts on non-target and protected species that co-occur with pollock, as well as regulatory actions taken by fishery managers to achieve these legal mandates. The legal requirements and actions taken to protect habitat from the adverse impacts of fishing-related activities are detailed in Section 3.3.6.

Significant issues for the evaluation team to consider under this principle relate to what scientists and managers *do not know* about the structure, productivity, and function of these two highly complex and variable ecosystems, and about the ecosystem impacts of removing such a large tonnage of biomass from the system. These knowledge gaps are important because they are directly related to the ability to understand, predict, and manage in response to environmental variability, to sustain the pollock fisheries over the long term, and to maintain the structure, productivity, function, and diversity of the ecosystems on which the fisheries depend.

The following three sections describe critical knowledge gaps and other issues associated with each of the main criteria identified under Principle 2, as well as efforts that are underway to address them. A number of research programs funded by a wide range of agencies are focused on improving knowledge of the Bering Sea/Aleutians Islands and Gulf of Alaska ecosystems, including the effects of climate variability on marine production, habitat, trophic interactions,
and the status and trends of non-commercial species. These programs are conducted by universities and research institutes throughout the Pacific Northwest and Alaska, by the NMFS and other government agencies, and, in some cases, by industry.

The evaluation team should consider several key questions when reviewing the status of current scientific research. First, is current research focused adequately on closing critical knowledge gaps? If so, what is the likelihood that this research will successfully fill these information gaps? Second, is current research focused on key hypotheses? If so, are management actions designed to, among other things, help test key hypotheses? Third, what is the timeframe over which research is expected to improve knowledge and has this been factored into management strategies? For example, different management strategies should be adopted if a key uncertainty is expected to be resolved in 1-2 years versus 10–15 years. And, finally, are managers adopting strategies that will help them to decrease scientific uncertainty, and adapting programs accordingly?

4.2.1 The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes

As a preliminary matter, it must be understood that the Bering Sea and Gulf of Alaska are very dynamic ecosystems. Thus, fishery management may have little or nothing to do with variability, and steady state concepts may be inapplicable to ecosystem state changes. Section 3.2.3 provides detail on regime shifts and decadal change.

Fishery managers have incomplete knowledge about the full set of trophic relationships in which pollock are embedded, competition with other species for prey, and indirect effects among species. The influence of oceanographic climate on all these relationships and the patterns and sources of long-term environmental variability create even more uncertainty, as they lead to changes in carrying capacity and in competitor, predator, and prey relationships. It is most likely that such variability does not move around a stable point or mean, or a well-defined cycle, but includes large and sudden shifts in system state and surprise (Scheffer *et al.* 2001). Thus, we have a moving target syndrome in which we may never have the ability to completely characterize and predict the behavior of the system.

There are a number of ongoing efforts to apply the growing understanding of the decadal-scale regime shifts described in Section 3.2.3.2 to the dynamics of higher trophic levels and to interactions among species. These efforts attempt to organize highly variable patterns of species increases and decreases, some of which are almost certainly natural in origin (NRC 1996; NMFS 2001a). Some of their findings are summarized below (see Francis *et al.* (1998) for a review of several of these):

- Parker *et al.* (1995) document strong similarities between the lunar nodal tidal cycle and recruitment patterns of Pacific halibut.
- Hollowed and Wooster (1995), Zheng and Kruse (1998), Rosenkranz *et al.* (1998), Hollowed *et al.* (1998), and Hare and Mantua (2000a) found that recruitment strength of some stocks of marine fish and crabs is correlated with a particular climatic regime, with recruitment generally stronger during El Niño-Southern Oscillation events for gadid species such as pollock, cod and hake. In contrast, salmon and large-mouthed flatfish (e.g., arrowtooth flounder, Greenland turbot, Pacific halibut) responded more strongly to decadal-scale climate regime shifts.
- Quinn and Niebauer (1995) found that high recruitment of Bering Sea pollock populations tended to occur during years of warm ocean conditions.
- Piatt and Anderson (1996) provide evidence of possible changes in prey abundance due to decadal scale climate shifts. These authors examined relationships between significant declines in marine birds in the northern Gulf of Alaska during the past 20 years and found

that significant declines in common murre populations occurred from the mid- to late-1970s to the early 1990s.

- Piatt and Anderson (1996) found that the diet of five seabird species in the Gulf of Alaska changed from one dominated by capelin (late 1970s) to one in which capelin was virtually absent (1988-1991).
- Interdecadal shifts in the northeastern Pacific Ocean ecosystem, particularly in zooplankton biomass and salmon landings, have been of the opposite sign from those in the California Current system (McGowan *et al.* 1998, Francis and Hare 1994).
- NMFS (2001a) documents that the total biomass of commercially fished species in portions of the Gulf of Alaska has increased since 1984, in spite of considerable and concurrent increases in fishing effort, as have the abundances of other, unfished species. Pacific ocean perch, an overexploited species, also rebounded. The primary factor for these increases appears to be environmental, with increased flow around the Gulf of Alaska related to enhanced nutrient supply on the shelf and upper slope areas, and a resultant increase in productivity.
- In addition, there is growing evidence that water temperature is a fairly reliable predictor of abundance for some species, with gadids more abundant during warmer periods and crustaceans such as shrimp and crabs more abundant during colder periods (GEM 2001).

There is also evidence that such large-scale biological responses to decadal-scale climate are not unique to the Bering Sea/Aleutian Islands and Gulf of Alaska ecosystems. For example, changes in abundance in sardine stocks off Japan, California and Peru appear to be synchronized with shifts in climate (Kawasaki 1991). These cycles extend back nearly 2000 years, as documented in paleoceanographic records from deep ocean sediments (Baumgartner *et al.* 1992).

Further, Klyashtorin (1998) has linked catch patterns of Japanese sardines, California sardines, Peruvian sardines, Pacific salmon, walleye pollock, and Chilean jack mackerel with an atmospheric circulation index that similar to the Aleutian pressure index. Pacific herring and Peruvian anchovy, among other species, have a negative relationship to this index.

As a final example, McGowan *et al.* (1998) have linked a variety of long-term biological changes in communities of the California Current system to interdecadal changes in ocean climate and more frequent shifts in community patterns to El Niño occurrences.

The evidence seems clear that changes in ocean climate can have a strong influence on patterns of primary and secondary production and, through them, on higher trophic levels. But, while the broad patterns of primary and secondary production have been documented, it is not clear how these are influenced by physical oceanographic processes, or how changes in productivity impact both individual populations of consumers and larger foodwebs.

For example, it is not yet possible to choose among the plausible alternative hypotheses summarized in GEM (2001; see below) and elsewhere (e.g., Francis and Hare 1994, Francis *et al.* 1998) about the linkages that lead to large-scale shifts in ecosystem state. Nor is it yet clear if the ecosystem periodically returns to a small number of well-defined states or configurations or whether the ecosystem moves over time through a series of unique states. If the former, then it would be useful to better understand the number of states and their characteristics, as well as their return frequency and any leading indicators that could help predict their occurrence. If the latter, it would be useful to know if there are overall boundaries or limits to possible ecosystem configurations and how resilient these are to various possible forcing factors.

In addition, there is evidence that ocean climate can act directly on higher trophic levels through its effects on reproductive success and behaviors related to habitat preference (e.g., temperature). But biological communities are also structured by interspecies interactions involving competition and predation. Despite intensive research, especially over the last several years, scientists studying the Bering Sea ecosystem have not yet determined how all these influences interact.

One attempt to understand species interactions is represented by the NMFS' efforts to develop and apply multispecies models to fisheries management in the Bering Sea and Gulf of Alaska (NMFS 2001a).[29] For example, Trites *et al.* (1999) used the Ecopath and Ecosim models to describe the Eastern Bering Sea in two states: 1) the 1950s, before large-scale commercial fisheries had been established and 2) the 1980s, after many marine mammal populations had declined. They documented major changes in trophic structure and energy flow that could not be completely accounted for by commercial fishing and/or whaling. In addition, the model results suggested that adult pollock and large flatfish might compete with Steller sea lions for food.

The Gulf Ecosystem Monitoring and Research Program (GEM 2001) provides a useful overview of the set of ecological hypotheses that could be applied to efforts to explain and understand patterns of ecosystem change in the Bering Sea/Aleutians Islands and Gulf of Alaska. In brief, these include:

- The match-mismatch hypothesis, which argues that, when environmental conditions change rapidly and the responses of predator and prey populations do not track in parallel, the transfer of energy into higher trophic levels is disrupted.
- The pelagic-benthic split hypothesis, which argues that alternating periods of strong and weak inshore plankton blooms will respectively shunt productivity in the benthic or pelagic compartments of the ecosystem, with consequent changes in community structure.
- The optimum stability window hypothesis, which argues that there is an optimum degree of water column stratification that leads to maximum productivity.
- The physiological performance and limits hypothesis, which argues that changes in abundance and distribution of certain species are direct responses to changes in environmental conditions.
- The food quality hypothesis, also known as the "junk food" hypothesis, which argues that the declines of many higher trophic level species in the last few decades are due to the prevalence of forage species with relatively low energy content.

[29] See also the website of the Resource Ecology and Ecosystem Modeling division of the Alaska Fisheries Science Center at www.refm.noaa.gov/reem/default.htm.

- The fluctuating inshore and offshore production regime hypothesis, which argues that both seasonal and decadal shifts in ocean climate optimize conditions for high productivity either inshore or offshore, but not both, with resultant impacts on higher trophic levels.
- The incremental degradation hypothesis, which argues that the cumulative effects of anthropogenic contamination and habitat alteration have impacted marine populations.

Some of these hypotheses are considered explicitly in Chapter 6 of NRC 1996, Chapter 3 of NMFS 2001a, in NMFS 2001d, and in the research results supporting NMFS 2001b.

The evaluation team should consider how well regime shifts and their implications for biological communities are understood, the ability to separate the impacts of regime shifts from those due to fishing (or describe their interactions), and the ability to detect regime shifts in near real time and/or to predict their future occurrence.

4.2.2 The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimizes mortality of, or injuries to endangered, threatened or protected species

Knowledge is also incomplete about the influence on the ecosystem of past and present human activities, particularly whaling and fishing. More and better data are needed to improve our understanding of fishery-related impacts on the environment, particularly on the seasonal distribution and foraging requirements of key prey stocks, the effects of fishing on benthic habitat and diversity, the distribution and taxonomy of non-target species, and on how each of these is affected by natural environmental variability.

One aspect that contributes to the uncertainty about human impacts is the very real possibility that the strength of such impacts, and the ability of the ecosystem to recover from them, may shift over time and space, depending on ecosystem state. While an improved understanding of regime shifts and other sources of variability has permitted such questions to be framed more realistically, they are far from being answered.

The draft Programmatic Supplemental Environmental Impact Statement (NMFS 2001a) and comprehensive Biological Opinion (NMFS 2001d) on Alaska groundfish fisheries recently developed by the NMFS provide a comprehensive analysis of the present knowledge of the effects of Alaska groundfish fisheries on biological diversity and the environment. Although the impacts of fishing can include demographic changes and other effects, this discussion focuses on fishery-related impacts on non-target species, protected species, and essential fish habitat.

4.2.2.1 Evaluating the impacts of fishing on non-target finfish and shellfish

Section 3.3.5.2 provides data on incidental catch and discard trends in the pollock fisheries. The evaluation team should consider several important points when analyzing this information and when evaluating the known effects of pollock fishing on non-target finfish and shellfish.

First, as described in Section 3.3.5.1, the term bycatch means different things to different people. It is important not only to have a clear understanding of the legal definition of bycatch (discards), but also to be aware of how the term is defined by those using it in descriptions of catch statistics and trends. This may require contacting the author of a particular document or dataset when the term is not expressly defined.

Second, the practice of summarizing and reporting catch data on North Pacific fisheries on a species-specific basis makes it difficult to analyze the current status and trends of incidental catch and discards on a fishery-by-fishery basis using the information contained in published reports. That said, the data needed to assess status and trends at the fishery level are available through the NMFS' Alaska Regional Office.

Agency scientists are willing to share data on incidental catches and discards of non-target groundfish upon request. And online catch statistics, including data on the take of other prohibited species, date back to 1993 and, in more recent years, are detailed even down to the individual vessel level. Although not summarized at the fishery level, anyone interested in assessing trends for most prohibited species need only perform a few calculations.

Third, the North Pacific pollock fishery is a complex fishery regulated by a complex suite of management measures. Thus, great care should be taken when analyzing and interpreting both published and raw data on catch and discards. We found agency scientists to be extremely helpful in this regard and we recommend that the evaluation team contact staff at the Alaska Regional Office with any questions regarding interpretation.

Finally, the North Pacific pollock fishery operates at an exceptionally large scale and this should not be forgotten when evaluating and interpreting data on incidental catches and discards. Discard rates have declined substantially over the past decade. Even so, the directed Bering Sea/Aleutian Islands and Gulf of Alaska pollock fisheries discarded a combined total of 13,523 mt of pollock and other groundfish in 2000 (Tables 7 and 8).

On the one hand, this number is remarkably low when considered relative to the total catch of 1,182,219 mt. The directed Bering Sea/Aleutian Islands fishery has reportedly been discarding only 1.1 percent or less of its total catch of pollock and non-target groundfish since 1998. On the other hand, discards still represent about one-half of one percent of the total biomass of Alaska groundfish, which is nearly 25,000,000 mt (NMFS 2001a). The ecosystem impact of those discards remains unknown. The evaluation team should consider whether rates of biomass transfer are adequate data for considering potential food web impacts.

4.2.2.2 Evaluating the impacts of fishing on protected species

Additional uncertainties relate to the impact of pollock fisheries on protected species. The current controversy over the status of the Steller sea lion highlights conflicting views about the strength of the interactions between human activities and ecological processes, as well as the degree to which time lags of varying lengths may be involved. For example, the localized depletion and whaling hypotheses described in Section 3.3.5.3.1 can be seen in part as a distinction between the roles of short and long time lags in the dynamics of the ecosystem.

It is likely that the intensive research underway on sea lion energetics and foraging behavior, the small-scale distribution of pollock and other prey near sea lion rookeries, and the linkages to the drivers affecting larger-scale ecosystem behavior will soon improve scientists' understanding of the relative contribution of the competing hypotheses described in Section 3.3.5.3.1. We therefore recommend that the evaluation team maintain frequent contact with researchers in these areas.

In addition, recent telemetry studies on Steller sea lion foraging patterns (NMFS 2001d) suggest that any interactions with the pollock fishery are more likely to occur in state than in federal waters. To the extent practicable, the evaluation team should include the Alaska state management system in its review, as well as any interactions between nearshore and offshore portions of the stock(s).

Trites *et al.* (1999) demonstrate how research in the area of multispecies modeling can produce counter-intuitive hypotheses that otherwise might not have been considered. For example, one of their models suggests that Steller sea lion populations would be larger if adult pollock and large flatfish were lower in abundance because all three species are significant competitors for the same prey. This feature of modeling efforts is often more valuable than the quantitative predictive value they may have.

We recommend that the evaluation team use the results of this and other related multispecies modeling efforts when considering potential interactions between the pollock fishery and the endangered Steller sea lion populations. In particular, we warn against the danger of presuming that the four explanatory hypotheses outlined in Section 3.3.5.3.1 represent the complete set of viable hypotheses to be considered.

4.2.2.3 Evaluating the impacts of fishing on habitat

Section 3.3.6.1 describes the legal requirements related to regulating the effects of fishing on essential fish habitat. Actions taken by fishery managers to meet this legal mandate are described in Section 3.3.6.2. A September 2000 court opinion concluded that the existing measures implemented by the North Pacific Council are sufficiently protective given the current status of data and information, but that the NMFS violated the Administrative Procedures Act by approving the North Pacific Council's essential fish habitat amendment without an adequate NEPA analysis (NPFMC 2002b). We recommend that the evaluation team monitor the agency's progress in addressing this deficiency through the preparation of a Supplemental Environmental Impact Statement, which is currently under development.

4.2.3 Where exploited populations ("impacted populations of species other than the fishery target species") are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term yields

Fisheries generally have unavoidable direct (e.g., incidental catches) and/or indirect (e.g., food web impacts associated with biomass removal) impacts on non-target species that co-occur with target species. These impacts can be significant, particularly when an affected non-target population is depressed for any reason, as is currently the case with some populations of red king crab and tanner crab, salmon, and with Steller sea lions.

Section 3.3.5 describes regulatory actions implemented in the pollock fishery to minimize both direct and indirect impacts on non-target finfish and shellfish and to assist the NMFS in achieving its Steller sea lion recovery goal "to promote recovery of the Steller sea lion population to a level appropriate to justify removal from ESA listings" (NMFS 1992).

Although several other alternatives were considered to have similar or less adverse effects on Steller sea lions than the Council's preferred alternative #4, that alternative has been approved by the NMFS as meeting both the ESA's "no jeopardy" requirement and the goals of the M- SFCMA (67 FR 5:956-1024).

The alternative chosen was examined not only in relation to its ability to avoid jeopardizing the Steller sea lion and to aid in the recovery of that species, but also in relation to the effects (including cumulative) it would have on other aspects of the ecosystem, including marine mammals, seabirds, commercial and forage fish species, non-commercial shellfish and invertebrates, habitat, and ecosystem relationships. The NMFS concluded that the chosen alternative had the least negative effects on the most affected resources, though recognizing its potential to have a "conditional significant negative" effect on northern fur seals.

The purpose of an environmental impact analysis is to inform the decision maker of the alternatives and possible consequences of an array of alternatives. The choice of Alternative #4 was made with consideration of the effects on northern fur seals. The tradeoffs often made to meet the multiple statutory mandates described in Appendix E have long been a point of contention in marine fishery management. When evaluating the effectiveness of fishery management measures in fulfilling the requirements of individual statutes, the evaluation team should consider the broader context within which such regulations are developed. Meeting such a wide range of legal mandates generally necessitates a certain degree of compromise.

4.3 Principle 3: The management system

Principle 3: The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Section 3.3 describes a management system for Bering Sea and Gulf of Alaska pollock that, over its 20-year history, has maintained the population of the target species while providing the largest catches and income of any American fishery. The fishery operates under a management plan and regulations devised within the framework of the M-SFCMA, with its ten National Standards, the stakeholder process provided by the North Pacific Fishery Management Council, the procedural requirements of U.S. administrative law, and more than 30 years of conservation policy embodied in U.S. environmental law. These elements form the basis of a management system that fits within the global framework for fishery management and contains most of the elements called for as best practices.

Principle 3 calls for a management system that respects local, national and international laws and standards. In the context of international standards, the pollock management system compares

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favorably to the U.N. Convention on the Law of the Sea, the global Code of Conduct for Responsible Fisheries, and the U.N. Straddling Stocks Agreement.

For example, Articles 5 and 6 of the U.N. Straddling Stocks Agreement and Articles 6 and 7 of the global Code of Conduct call for long term measures based on the best available scientific evidence, prevention of overfishing, application of the precautionary approach, environmental impact assessment, protection of related species in the ecosystem, protection of biological diversity, consideration of artisanal and subsistence use, a transparent and accessible system and information, data collection, promotion of scientific research, and enforcement.

In an annex elaborating the precautionary approach, the U.N. Straddling Stocks Agreement calls for reference points and catch strategies of the type that are included in the pollock fishery management plan. Compare, for example, the catch specifications described in Section 3.3.4.3 with Annex II (7), which states, "The fishing mortality rate which generates maximum sustainable yield should be regarded as a minimum standard for limit reference points. For stocks which are not overfished, fishery management strategies shall ensure that fishing mortality does not exceed that which corresponds to maximum sustainable yield, and that the biomass does not fall below a pre-defined threshold."

Similarly, Article 7.6.9 of the global Code of Conduct for Responsible Fisheries calls for "appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species," and then proceeds to describe measures that are comparable to efforts in the pollock fisheries to reduce bycatch and discards and to avoid prey competition with Steller sea lions (see Sections 3.3.5 and 3.3.6).

Although the framework is there, the system has not operated or been implemented entirely without challenge or controversy. The Steller sea lion case history set out in Box 1 describes one example where the system was slow to respond to legal requirements provided by the NEPA and ESA, and to public interest concerns about ecosystem effects, and where the council process was not adequate for integrating multiple statutory mandates.

Significant issues for the evaluation team to examine under this principal relate to the degree of confidence in stock assessments, the availability, use, and integration of ecosystem information, the way the system deals with uncertainty, especially about ecosystem effects beyond the target species, and about fishery activity and management outside the U.S. Exclusive Economic Zone, and the vulnerability of the U.S. fishery management system to political and legal challenge.

Critical knowledge gaps that make it difficult for the management system to respond to these issues include the inherent uncertainty of stock assessments, the developing state of ecosystem-based approaches to fishery management that might provide a framework for integrating non-fishery data, and a lack of information about management, operations, and catches in Russian waters, including lack of understanding of stock structure among the various pollock stocks. Another important knowledge gap is one that does not fall in the category of scientific knowledge, but in the realm of managerial "know-how." It is in this area that many of the political and legal challenges arise because managers have not followed key procedural steps or have not engaged in the kind of communication and teamwork that would raise key issues before critical decision points in the process.

The following sections summarize these issues under the rubric of MSC sub-criteria 1-5, as published in *Bering Sea/Aleutian Islands and Gulf of Alaska Pollock Fisheries Evaluation, Revised Performance Indicators and Scoring Guideposts for MSC Principles*, February 2002.

4.3.1 The management system has a clearly defined scope capable of achieving MSC Principles and Criteria and includes short and long-term objectives, including ecosystem objectives, consistent with a well managed fishery

4.3.1.1 Objective-setting

Objective-setting is one of the most often criticized elements of the U.S. fishery management system. The National Research Council and others have cautioned that it is critical to have all stakeholders participating in the process to develop objectives for a fishery. The Heinz Center (2000a) points out that fishery management councils rarely take time to set objectives and are too burdened to do more than react to short-term problems. These and other sources advocate developing concrete, measurable objectives that go beyond biological measures, and that would incorporate the kind of planning that takes community, cultural, societal, and economic goals into account as well.

The pollock fishery management plans have included goals and objectives since the outset of the fishery (See Section 3.3.2), and those goals extend beyond just the target species and the economic benefits of their yields. Most of the biological goals, and many of the social and economic goals, have measurable objectives.

The North Pacific Council, like other councils, has only recently begun to examine goals that would accomplish alternative policies to sustainable fishing, economically viable fishing communities, and other such fishery-centric goals. For example, in recent actions to revise the Programmatic Supplemental Environmental Impact Statement (see below), the Council and the NMFS are spending time analyzing an array of objectives ranging from those that would accomplish solely ecosystem protection objectives to those that would achieve fishery maintenance targets. Fishery management council consideration of goals and objectives that are not directly related to fish, fishing, and fishing communities is a new area of endeavor, and one that recognizes a stewardship role beyond fishery management and allocation. The North Pacific Council is one of the first venturing into this arena.

Another area where objective-setting could be improved is in how planners make use of ecosystem-based approaches, and how they incorporate ecosystem objectives into fishery management plans. Several recent reports are contributing to efforts to begin this process, and ecosystem-based approaches are being tested in a few specific regional sites. An emerging consensus among scientists and managers is that moving toward ecosystem-based fishery management will require a series of incremental steps, not the least of which is refining and improving single-species management and habitat protection (Sissenwine and Fluharty 2002).

Livingston (2001) reports that the North Pacific Council has been reviewing broader, ecosystem-level information since 1994, when a new Ecosystem Considerations chapter was added to the groundfish Stock Assessment and Fishery Evaluation Report. Originally, this chapter contained summaries of recent ecosystem research, including objectives for ecosystem-based management, as well as status and trends information on protected species.

Several years ago the NMFS suggested that the content of this chapter be standardized and that it include information on the status and trends of the physical oceanography and climate, biological oceanography, habitat and effects of fishing research, marine pollution, predator-prey interactions, forage fish and other non-target species, and marine mammals and seabirds, as well as discussion of the possible factors affecting trends.

As described by Livingston (2001), the two-part purpose behind this suggestion was to "1) bring the results of ecosystem research efforts to the attention of stock assessment scientists and fishery managers in order to provide stronger links between ecosystem research and fishery management, and 2) bring together many diverse research efforts into one document, which would spur new understanding of the connections between ecosystem components and the possible role that climate, humans, or both may have on the system."

The NMFS and the North Pacific Council are currently working together to expand the chapter on Ecosystem Considerations to include ecosystem status and trends information, and management indicators. Future work will focus on developing more quantitative management objectives and ecosystem indicators that will trigger pre-defined management actions. Current scientific research in this area will be critical to the Council's ability to develop the practical means to incorporate ecosystem considerations into fishery management decision making. The Council's Ecosystem Committee has been charged with helping with this challenge (Livingston 2001).

Recommendations on principles of ecosystem management include recognition of the unpredictability of natural systems and the need to build buffers into social institutions and management plans to provide insurance against uncertainty.[30] The NMFS has convened a task force to propose guidance for fishery managers on implementing ecosystem-based approaches. That work is expected to be complete this summer (Dieter Busch, NMFS Office of Habitat Protection, personal communication, January 2002).

4.3.2 The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral, and explicit basis

This area is one where the management system is most vulnerable to challenge and where significant improvement can be made. The integration of multi-disciplinary scientific information, an array of legal mandates and operational deadlines, and management practices cannot be ignored as major contributing factors to recent challenges to the management of this fishery. The present shifting legal status of the groundfish fisheries, and the fact that a federal court has retained jurisdiction over resolution of issues raised in *AOC v. Daley* clearly

[30] See NMFS 1999: Ecosystem-Based Fishery Management: A Report to Congress by the Ecosystem Principles Advisory Panel. April. Available online at http://www.st.nmfs.gov/st2/Eco-bas-fis-man.pdf.

demonstrate that the management system is not "consistently in compliance with all substantive and procedural aspects of applicable domestic law." The main problems arise in the way the system is implemented, specifically within the operations of the NMFS and the North Pacific Council:

- The relationship between the NMFS and the North Pacific Council;
- Integration of information and management authority among line offices within the NMFS; and
- Communication and integration among NMFS headquarters, the Alaska Fisheries Science Center, and the Alaska Regional Office.

The General Accounting Office, the Office of Management and Budget, the Council on Environmental Quality, a Senate appropriations subcommittee, several internal National Marine Fisheries Service reports, and the National Academy of Public Administration, all have pointed out problems with the NMFS' compliance with the NEPA and with ESA consultations. Criticisms are that:

- Managers do not view conservation and procedural statutes as tools that can assist agency decision making and strengthen its ability to withstand public and legal scrutiny;
- Managers have not made NEPA analysis or ESA consultation a priority;
- Organizational structure and chain of command (science centers, line offices, regional offices) have traditionally been flat, decentralized and regionally independent, making compliance with legal mandates, cohesive policy-setting, supervision, and oversight difficult;
- The decision process and review of decisions is confusing and inconsistent and lacks concrete guidance, deadlines, and policies. Attempts to recommend improvements, such as charter and other advisory teams, remain "on the shelf;" and
- Personnel (in number and training) and fiscal resources are inadequate to the demands of multiple mandates and procedural requirements.

The controversy surrounding council and agency actions related to ESA consultation on Steller sea lions is an example of what occurs when these circumstances combine. Information on Steller sea lions was not brought into fishery management deliberations prior to decision making, nor was there any of the kind of iterative "consultation" anticipated by the ESA process, where the acting agency and consulting agency can discuss ideas and options.

When the conclusions of the review by the agency's protected resources scientists were released in the November 2000 Biological Opinion, the analysis and the proposed measures were a surprise. The conclusions contained in the opinion also raised legitimate questions, and were ultimately deemed unacceptable by the North Pacific Council and the fishing industry.

Under conventional circumstances, no federal agency proposing an action that would affect endangered species - let alone an advisory body with only quasi-regulatory authority - would be able to outright reject the advice of the consulting agency in a Section 7 situation. In this case, some constituents of the council - the fishing industry - took matters into their own hands and sought legislative relief from what they saw as onerous restrictions on the fishery.

The resultant appropriations rider bought a year of time for studies, stakeholder discussions, and collaborative development of alternative approaches to avoiding jeopardy in the fishery. But it cannot be denied that the rider circumvented the ESA by prescribing that any sea lion protection alternatives would have to be reviewed and implemented via the regional council process in the course of fishery management planning, rather than imposed by the consulting agency as reasonable and prudent alternatives under the ESA.

The NMFS is currently developing a report to Congress that will detail the agency's plans for improving compliance with the NEPA, ESA, and other substantive and procedural requirements. Support for improving performance has been forthcoming in special appropriations for additional staff, training, and special projects related to developing programmatic environmental impact statements. The North Pacific Council and agency managers in Alaska and Seattle who are working on the groundfish fisheries have undertaken offered training, and are continuing efforts to improve NEPA compliance and other means to better integrate information and conservation mandates into fishery management decision making.

4.3.2.1 Consultative Process

The North Pacific Council operates under requirements in U.S. law for public participation and stakeholder involvement. The M-SFCMA requires knowledgeable persons to serve on the councils, and provides for advisory panels, public meetings, public hearings, and minimum notice requirements. In addition, federal laws regarding open meetings, notice and comment rulemaking, and other aspects of administrative procedure assure access to information, documents, and decision making processes.

Fishery management plans are considered a major federal action that triggers preparation of an environmental assessment and potentially an environmental impact statement. Preparation of these decision analysis documents also has requirements for public scoping, notice, and comment. See *Fishing Grounds* (The Heinz Center 2000a) for a detailed discussion of the participatory process in U.S. fishery management.

The fishery management council process is open and participatory and provides a forum for all interested and affected parties. But the regional fishery management councils in general, and the North Pacific Council in particular, have been criticized for perceived conflicts of interest, voting self-interest, vote trading, and lack of diversity of members. Much of this is attributable to the statutory framework under which council members are appointed, including exemption from federal conflict of interest rules applicable to most other comparable decision making bodies, and the political nomination and selection process that creates the councils.[31] Today the North Pacific Council composition includes one federal manager, three state managers, a recreational representative, an independent environmental

[31] See *Managing U.S. Marine Fisheries: Public Interest or Conflict of Interest*, World Wildlife Fund (1995); Mhyre, W. "The Law of Unintended Consequences," in *Conserving America's Fisheries*, Proceedings of a National Symposium on the Magnuson Act, March 8-10, 1993, New Orleans, LA (1994).

consultant, a trawl and longline industry representative, an academic, a shoreside processing industry representative, a small boat representative, and an Alaska Native representative.

4.3.2.2 Responding to stakeholder concerns and legal mandates

The objectives and interest of non-fishing stakeholders are not always accounted for in the regional council process. Procedural avenues such as public hearings, comment periods, and public testimony provide opportunities for many diverse views to be expressed. But, over the history of the North Pacific Council, the views of fishery participants have generally defined issues for discussion (WWF 1994). In addition, social and economic impacts on fishing communities are by law an integral consideration in fishery management planning.

The regional councils play a major role in framing fishery management decisions, but have not historically seen their role extending to conservation or to the recovery of affected species that are not fishing targets. The NEPA, one of the procedural tools the system provides to stakeholders, is intended not only to broaden consideration of the alternatives and impacts of federal decision making, but also to engage a broader segment of the affected public.

The delegation of important policy making and decision analysis responsibilities to the regional councils was intended to get them to use the NEPA process in conjunction with the M-SFCMA to consider alternatives and impacts early on. In practice, this delegation of authority has at times constrained the NMFS' ability to respond effectively to its full range of mandates, including the protection of endangered species. Much of the litigation the agency has had to deal with in the past several years, including *AOC v. Daley's* specific challenge to the pollock fishery, has been about just such procedural infirmities in the decision making process.

Just as litigation has forced other resource agencies over the past decade to recognize the broader public interest in natural resources and to reform their decision making processes to better balance conservation and use, the current situation suggests that the public is holding the NMFS accountable for the broader set of environmental and resource values codified in the NEPA, ESA, and other statutes besides the M-SFCMA. The NMFS' institutional culture has traditionally put fishing first. The agency has not until recently made NEPA analysis or ESA consultation a priority in its scientific and policy work. But this is beginning to change.

In response to criticism by the federal district court that its environmental analysis process was inadequate and that the underlying environmental impact statement for the North Pacific fisheries was outdated, the NMFS undertook preparation of a Programmatic Supplemental Environmental Impact Statement. The document of more than 3000 pages was released in January 2001, and managers responded to stakeholder requests for additional review time, extending comment periods three times during the summer of 2001. After receiving more than 20,000 public comments on the document, which set out an array of alternatives for managing the groundfish fisheries and for protecting Steller sea lions, the agency in November 2001 withdrew the analysis for further work on proposed alternatives.

At a meeting of the North Pacific Council in early February, the agency presented a proposal for additional alternatives to be analyzed. The new approach includes examination of an array of competing goals and objectives, including goals that have only ecosystem protection or endangered species recovery objectives, goals that have fishery objectives, and goals that have combinations thereof. Discussion with council and stakeholders at the meeting resulted in modifications and a set of seven very different policy goals, with measurable objectives. Alternatives and consequences under each of the scenarios will be analyzed in the revised Programmatic Supplemental Environmental Impact Statement.

4.3.3 The management system includes a rational and effective process for acquisition, analysis, and incorporation of new scientific, social, cultural, economic, and institutional information

4.3.3.1 Biological data

Various independent trawl and acoustic survey programs collect biological data in the Bering Sea and Gulf of Alaska (see Section 3.3.7.2.2). These are supplemented with data collected through the fishery observer program.

The North Pacific Council requires observers on large- and medium-sized vessels that fish for groundfish in waters off Alaska (See Section 3.3.7.2.1.2; Table 13). Vessels longer than 125 feet must carry observers during all fishing operations, and vessels from 60 to 125 feet must carry observers 30 percent of the time. This observer program is the only one of its kind in any U.S. fishery (see Table 12). But improvements could be made related to coverage and the hiring process.

Under North Pacific Council requirements, vessels obtain observers directly from private observer companies. While the NMFS certifies observers that have passed training, it has no role in selecting or distributing observers to vessels. Direct contracting of observers by vessels presents an opportunity for vessels and observer companies to select observers "satisfactory" to a vessel. In the extreme, this could result in observers benefiting the vessels by not performing all duties with due diligence.

Observer coverage of vessels in the 30 percent coverage category is not random at the vessel level. An independent review carried out in 1999/2000 (MRAG Americas 2000) indicated that this has the potential to introduce unknown bias into the dataset. The review cited a high likelihood of differences in vessel behavior between observed and non-observed vessel days, both in terms of fishing patterns and compliance with management measures.

In addition, while the 30 percent coverage level may provide sufficient coverage for routine sampling, it may not provide enough spatial and/or temporal coverage for special scientific programs (e.g., otoliths, stomach contents sampling for ecosystem studies). A further problem may be that less observer coverage may result if there is increased participation in the fishery by smaller vessels (i.e. those not requiring 100 percent coverage) as a result of the AFA.

The review recommended the development of a mechanism under which the NMFS has direct control over coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage. To date, this recommendation has not been implemented.

An important function of the observer program is to collect data on discards. Significant quantities of pollock are discarded (See Section 3.3.5.2.1; Tables 5 and 6) and must be taken into account in estimation of population size and forecasts of yield. Observer length frequency observations indicate that discarded pollock include both large and small pollock. Since observers usually sample the catch prior to discarding, the size distribution of pollock sampled closely reflects that of the actual *total* catch. Discard data compiled by the NMFS Alaska Regional Office have been included in estimates of total catch since 1990 (Ianelli *et al.* 2001).

4.3.3.2 Social and economic data

The paucity of social, cultural, and economic information available to fishery managers is as well recognized as the critical need for such information. The two bodies chartered under the Federal Advisory Committee Act to provide advice to the National Oceanic and Atmospheric Administration (the Marine Fisheries Advisory Committee and the Science Advisory Board) called for increased capacity in the social sciences in separate reports to the U.S. Secretary of Commerce in 2000.

Of the approximately 2,680 people employed by the NMFS in 2000, just 34 were economists, and only three were non-economist social scientists (i.e., anthropologists) (McCay 2001). Yet much of the decision analysis required in fishery management planning by the M-SFCMA, NEPA, and Executive Orders - and in devising reasonable and prudent alternatives under the ESA - requires assessing and balancing environmental considerations with social and economic considerations.

In addition to the lack of assessment and analysis, it is difficult to acquire many types of economic information, including sales and income information. For example, statistical information on U.S. fisheries does not include proprietary economic information because laws protecting business interests restrict collection of such data. Data on non-market, non-use, cultural, aesthetic, and existence values are generally a low priority, and these social aspects of fisheries are difficult to measure (The Heinz Center 2000a).

One of the most difficult continuing issues for the North Pacific Council and managers of the Bering Sea/Aleutian Islands and Gulf of Alaska groundfisheries is the question of effort reduction, an issue driven entirely by social and economic concerns. As described in Section 3.1, government support to develop U.S. fishing and processing capacity contributed to rapid growth. By the time the fishery was completely Americanized, it was already overbuilt. The excess capacity manifested itself in the historical rivalry between onshore processors in Alaska and offshore processors. This geographic/political conflict played itself out in the onshore/offshore allocation battle, which eventually divided the total catch, but left both sectors with more catching and processing capacity than necessary to take the total allowable catch.

A license limitation put in place in 1995 did stop new entrants from coming in the fishery, but did little to reduce the fishing power already in the Bering Sea and Gulf of Alaska, or to stabilize ownership.

The advent of cooperatives and the passage of the AFA have changed the trawl sector of the pollock fishery considerably (See Section 3.1). Other sectors, such as the crab fleet and the groundfish fleet in the Gulf of Alaska, are examining cooperatives for their fisheries. Inshore cooperatives are authorized by the AFA, but have only been organized or operating less than a year.

Another legislative initiative to craft a similar buy-out for crab vessels in the Bering Sea is a response to the continuing moratorium on the development of individual fishing quota programs. Although originally set to expire in 2000, Congress has yet to act on legislation that would specifically amend the M-SFCMA to address the parameters under which quota programs would be allowed. This limits the tools available to fishery participants and managers to address capitalization problems.

4.3.4 The management system applies information through implementation of measures and strategies (by rule or by voluntary action of fishery) that demonstrably control the degree of exploitation of the resource in the light of the natural variation in ecosystems

Management measures in the Alaska groundfish fisheries track three of the five elements of the 100 percent scoring guidepost and all elements of the 80 percent scoring guidepost for this criterion. Fishery managers have taken actions to control the catch of target species (Section 3.3.4.2), to reduce bycatch and minimize waste (Section 3.3.5.2), to minimize habitat damage (Section 3.3.6.2), and to improve monitoring and compliance (Section 3.3.7.2.1.2).

Catch levels are set and limited by target species population goals, including goals for population subcomponents. The management system applies the precautionary approach. And there is no evidence that the productivity of pollock is declining as a consequence of the catch level. Catch levels are also set considering available information on predator-prey dynamics, prey abundance, essential fish habitat needs, and ecosystem-based considerations.

The policies and management measures devised by the North Pacific Council are implemented in the fishery through regulations promulgated by the NMFS. Season openings, closures, identified areas for fishing as well as areas where trawling is prohibited, catch limits, prohibited species caps, gear types, sizes, and configuration all are specified in the regulations. Enforcement is performed cooperatively by the U.S. Coast Guard, the NMFS, and the Alaska Department of Fish and Game.

The Alaska Commercial Fisheries Entry Commission keeps track of licenses, limited entry, and other permits. In-season management occurs through daily electronic reporting by the fleet. Electronic information on catch and bycatch is used not only for closures when participants in the groundfish fisheries near their respective total allowable catch quota or prohibited species caps, but also to avoid areas where bycatch occurs.

Various sectors of the fleet have instituted voluntary actions to improve data collection, to enhance compliance through electronic communication and peer pressure, and to reduce excess capacity. By conventional fishery management standards, the system and fishery operation are models.

That is not to say that "conventional standards" are good enough, or that there is not room for improvement. Given the near certainty of ecosystem-wide changes of some kind in the future, we recommend that the evaluation team consider the extent to which the management system, and the fishery itself, can adapt to potentially rapid and severe changes in stock structure, abundance, and distribution. Any serious failure in the ability of the fishery and the management system to successfully adapt to the variability and uncertainty inherent in these ecosystems will create pressures, both economic and biological, that will undermine the potential for sustainability of both the human and biological aspects of the fishery.

In particular, we recommend that the evaluation team assess the degree to which the management system takes advantage of opportunities to build into its decisions experiments that will reduce key elements of uncertainty and/or elucidate the costs and benefits of alternative management options.

The temporal and spatial scales of the processes that structure the Bering Sea/Aleutian Islands and Gulf of Alaska ecosystems probably exceed the span of control of the existing management system, especially with regard to the temporal scale.[32] Managers have improved the appropriateness of spatial scale by considering catches and management actions throughout the Bering Sea. This is consistent with the size of the ecosystem. But temporal scale span of control is much more difficult to achieve.

For example, in responding to declines in Steller sea lion populations, the initial models were designed to assume that the removal of a fish made prey immediately unavailable to sea lions, without recognizing the time lags that occur as a natural component of ecosystem function. We recommend that the evaluation team consider the ability of the management system to operate over the spatial and temporal scales relevant to the Gulf of Alaska and Bering Sea ecosystems.

4.3.5 The performance of the management system is regularly and candidly evaluated and adapted as needed to improve

The M-SFCMA and implementing regulations promote a fair amount of evaluation through specific provisions, as does the NEPA and other laws. But the crisis-atmosphere that drives fishery management decision making rarely affords the opportunity to evaluate the success of past actions and to adapt management accordingly.

Fishery managers at the national and regional level maintain that they do not have the staff, time, or funding needed to adequately evaluate all aspects of fishery performance, particularly the social aspects. Not only does this divert resources, it can also dictate institutional priorities. In addition, the vagueness or just the sheer number of established goals and objectives can make it impossible to quantify their impact in any meaningful way. The Heinz Center (2000a) provides

[32] Cybernetics literature posits in the law of requisite variety that, given a system and some regulator of that system, the amount of regulation attainable is absolutely limited by the variety of the regulator. Therefore, regulations and management actions must operate at the same scale as the ecosystem. See Clemson, B. 1984. Cybernetics: a new management tool. Kent, UK: Abacus Press.

more background on these and other related issues in the chapter titled *Evaluating Fishery Performance*.

The continuous stream of notices, rules and regulations published in the Federal Register may provide the impression that Alaska pollock fisheries are indeed adaptive and responsive to change. And, to a large degree, they are. For example, new theories, concepts, and data are incorporated into stock assessment modeling to improve knowledge and understanding of target stocks (Section 3.3.7.1). A flexible six-tier framework allows managers to calculate catch specifications using different formulas, depending on the amount and reliability of available scientific information (Section 3.3.4.2). And a comprehensive monitoring program enables managers to close fisheries or fishing areas ahead of schedule when in-season catch reports and/or observer data indicate that the total allowable catch has been taken, or that prohibited species caps have been achieved (Sections 3.3.3 and 3.3.5.2).

But most of the day-to-day changes proposed by the Council appear to be driven largely by external pressures associated with meeting the needs of fishery participants, rather than by information derived from routine internal assessments conducted to determine whether the fishery is meeting its stated goals and objectives. Managing fisheries to achieve competing biological, social, and economic goals and objectives leaves managers increasingly vulnerable to stakeholder pressure, as well as to litigation, which is another important external force driving changes in the fishery management system, as managers are required to adapt rules and regulations to comply with the orders and findings of the Court.

5 CONCLUSIONS AND RECOMMENDATIONS

The ten main issues we have identified under the three MSC principles are summarized below. They relate to how managers use alternatives to single species models, how they integrate information from disciplines outside fishery management, how they promote, test and evaluate ecosystem-based approaches, and how they apply environmental risk and impacts analysis and other integrative decision processes.

Each numbered issue is followed by a description of the problem, the specific performance indicator(s) under which the issues arise, and how the point relates to a fishery's performance for the specified indicator. The information supporting each point is referenced to the relevant issue subsection, with citations to data or other documentation. In some cases we have recommended areas where the certification team should concentrate its inquiry. In others, we have made specific recommendations about how management could be improved. We have not drawn conclusions or made specific recommendations on scoring, though it can be assumed that in areas where we have raised no concerns, it is our view that management meets the MSC standard for that indicator.

1. **Stock assessment modeling is state-of-the-art, but assessments could be improved with additional calculations predicting the probability of overfishing under current control rules.**

Sections 3.3.4 and 3.3.7 detail assessment processes and exploitation strategies for Bering Sea/Aleutian Islands and Gulf of Alaska pollock fisheries that meet standards set by U.S. law and best practices described in international conventions. But, as described in Section 4.1.1.2, more precaution could be built into assessments used by fishery managers to determine catch specifications in the Gulf of Alaska if probability analyses were used to predict the likelihood that fishing mortality and spawning stock biomass will be maintained within threshold levels under various catch scenarios. This issue relates to Principle 1 indicator 1.1.2.3.1.

According to a preliminary assessment conducted by Dorn *et al.* (2001), there is a 19-35 percent probability of exceeding the 2002 overfishing level established for the Gulf of Alaska fishery for 2002. While the risk of exceeding the overfishing level in one or two years does not cause much concern for a stock above minimum biomass thresholds, continued fishing above the overfishing level could drive the stock below threshold values. But it is important to note that the conservative approach used by fishery managers to define overfishing and to establish annual catch specifications makes this an unlikely scenario.

The use of F_{MSY}, and of $F_{40\%}$ as an estimate of F_{MSY}, creates a precautionary buffer that would probably prevent biomass from declining below threshold levels, even if the overfishing level were exceeded. Thus, only if managers were consistently overestimating would this pose a problem. And there is little risk that will occur, as the catch specification process allows overestimations to be corrected on an annual basis. For these reasons, the costs of conducting additional analyses might not outweigh the benefits.

We recommend that managers consider the benefits of adding an additional step to Gulf of Alaska assessments that would calculate the probability that various catch scenarios would be capable of maintaining fishing mortality and spawning stock biomass within threshold levels. The length of these projections should be determined by fishery analysts, but, at minimum, should equal the life span of the fish.

2. **Incomplete knowledge about the effects of fishing on population and ecosystem structure, and about the structure of Bering Sea pollock and fishing mortality in Russian waters, creates uncertainty about appropriate exploitation rates.**

As the walleye pollock fishery has matured, it has tended to concentrate more and more in time and space. The effect of this concentration on population and ecosystem structures and relationships is not well understood. As discussed in Section 4.1.3, the reproductive capacity of a stock may be affected by such changes in fishing patterns. This relates to Principle 1 Criterion 3.

In addition, existing uncertainties about the exchange between pollock populations in the eastern and western parts of the Bering Sea described in Section 3.2.1.3 make it difficult to determine with accuracy the appropriate level of fishing mortality on what is currently defined as the Eastern Bering Sea stock. As discussed in Section 4.1.1.1, it is possible that the Eastern Bering

Sea stock could be impacted at lower stock levels by current fishing practices in Russian waters. This issue relates to Principle 1 indicators 1.1.2.3.4.2 and 1.1.2.3.5.1.

It is important to note that fishery managers have been cautious in dealing with incomplete knowledge of stock structure and Russian catches. The U.S. management regime conservatively assumes that pollock targeted in the western and Eastern Bering Sea are of the same stock. And Russian fishing mortality is accounted for in the assessment of total allowable catch quotas and other management measures established for the U.S. fishery. Thus, the only real danger associated with this uncertainty lies in the highly unlikely scenario that environmental conditions consistently pushed a higher than normal population of pollock from the Eastern Bering Sea into Russian waters.

We recommend that the evaluation team and managers examine the effect on population structure of the concentration of pollock fishing in time and space. Changes in mean age have been relatively slight compared to interannual variation in mean age for walleye pollock in the Gulf of Alaska. The evaluation team should examine whether the age structure of the Bering Sea stock has changed in response to fishing pressure. More research is needed on the reproductive biology of pollock to improve understanding of the effects of fishing on reproductive capacity. And managers should pursue ongoing work with Russian scientists to define stock structure and to improve understanding of genetic variations of pollock throughout the Bering Sea.

3. **The observer system currently used in the Alaska pollock fishery is one of the best in the world. But improvements could be made in several areas.**

The observer program described in Section 3.3.7.2.1.2 is the only one of its kind in any U.S. fishery (see Table 12). But, as described in Section 4.3.3.1, improvements could be made related to coverage and the hiring process. This issue relates to Principle 1 indicators 1.1.2.3.4.5 and 1.1.2.3.5.2.

First, observer coverage of vessels in the 30 percent coverage category is not random at the vessel level. According to MRAG Americas (2000), this has the potential to introduce unknown bias into the dataset. Second, the use of independent contract observers could potentially result in biased reporting.

We recommend that the NMFS develop a mechanism under which the agency has direct control over the coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage.

4. **Incomplete knowledge of environmental influences on stock dynamics and of the effects of fishing on ecosystem structure makes it difficult for managers to clearly distinguish the relative effects of natural and anthropogenic factors on stock dynamics and ecosystems, or to predict how changes in ocean climate will affect stocks and ecosystems in the future.**

Section 3.2.3.3 describes the current level of uncertainty regarding the effects of longer-term and larger-scale shifts in oceanic climate regimes on the ecosystem in general and the pollock stock(s) in particular. These knowledge gaps make it difficult to distinguish between the effects of human and environmental impacts and to predict changes in production (particularly in recruitment) that could result from changing environmental conditions. This issue relates to Principle 1 indicator 1.1.2.3.4.6.

In addition, although many areas have been closed to fishing, managers have yet to designate specific no fishing areas as control, or "test," areas that can be used to scientifically evaluate the effects of fishing on ecosystem structure and function. This issue relates to Principle 1 indicators 1.2 and 1.4.1.

It is important to note that there is no large ecosystem in the world for which definitive knowledge exists on the relative effects of natural and anthropogenic factors. And research to improve our understanding of the effects of environmental variability on productivity is actively underway.

We recommend that researchers continue to focus on better understanding the effects of environmental variability on stock dynamics, and that they designate no fishing areas that can be used to study the effects of fishing on ecosystem structure and to evaluate the impact of conservation measures on marine ecosystems, particularly on the predators of pollock. We also recommend that managers incorporate new information derived from these studies into stock assessments and ecological analyses.

Recognizing, however, that no amount of money or research will eliminate all uncertainty, the management system should move away from an emphasis on predicting the most likely outcome. Instead, the management system should make much more use of scenario planning and other well-developed tools that aid in developing management strategies that are robust under several possible futures. Though the draft Programmatic Environmental Impact Statement does define alternative management approaches, these are considered independently and do not incorporate the more fully developed planning methods used in business, the military, crisis planning, and policy analysis.

5. **Bycatch reduction and monitoring programs are effective. But bycatch reporting could be improved.**

Section 3.3.5.1 describes the legal requirements to minimize bycatch and bycatch mortality in fisheries managed under federal fishery management plans, and to establish a standardized reporting methodology to assess the amount and type of bycatch occurring in managed fisheries. Section 3.3.5.2 outlines the aggressive actions fishery managers have taken to accomplish this in the Gulf of Alaska and Bering Sea pollock fisheries. As noted in that discussion, the North Pacific Council's bycatch monitoring and reduction program is the best developed of any U.S. fishery.

Sections 3.3.4.2.1 and 3.3.5.2.2 describe the status and trends of pollock discards in all Alaska groundfish fisheries, as well as the status and trends of discards in the "directed" Gulf of Alaska and Bering Sea pollock fisheries, based on data provided in Tables 5-10. These data indicate that the North Pacific Council's Improved Retention Improved Utilization program has been successful in reducing total pollock discards in all groundfish fisheries to the lowest levels observed in ten years, that discards in the "directed" BSAI and Gulf of Alaska pollock fisheries have been reduced to about one percent and two percent of total catch, respectively, and that the discard rates of prohibited species are also remarkably low. Therefore, we believe that the bycatch program has been effective. The only improvements we suggest in this area relate to how bycatch data are summarized and reported to the public. This issue relates to Principle 2 indicator 1.2.1.

We note in Section 4.2.2.1 that the current practice of summarizing and reporting catch data on North Pacific fisheries on a species-specific basis makes it difficult to analyze the current status and trends of incidental catch and discards on a fishery-by-fishery basis using the information contained in published reports. Again, there are exceptions, such as the annual report of the Pollock Conservation Cooperative and High Seas Catchers' Cooperative, which details both the amount and composition of catch captured and discarded by each cooperative vessel participating in the directed Bering Sea/Aleutian Islands pollock fishery. Additionally, the data needed to assess status and trends at the fishery level can be obtained through the NMFS' Alaska Regional Office. And data on the take of other prohibited species dating back to 1993 are available online.

We recommend that managers continue efforts to minimize bycatch, and that they consider summarizing and publishing incidental catch and discards data at the fishery, as well as single-species, level to help the public better understand the impacts of individual fisheries on non-target species. We recommend that scientists continue efforts to determine, through research, the impact of bycatch on the integrity of marine food webs.

6. **Incomplete knowledge about the trophic relationships among pollock and other species in the Bering Sea and Gulf of Alaska ecosystems makes it difficult to determine management strategies that are optimal for preserving critical relationships.**

As described in Section 4.2.1, managers have incomplete knowledge about the trophic relationships among pollock and other species in the Bering Sea and Gulf of Alaska ecosystems, and about how these relationships may be affected by large-scale climatic and oceanographic changes. These knowledge gaps make it difficult to predict and manage the impacts of the pollock fishery on other target and non-target species. This issue relates to Principle 2 indicator 1.2.3.

The evaluation team should examine the extent to which managers are employing alternate analytical concepts to take into account the potential effects of ecosystem changes. Multispecies modeling could be a way to promote alternative thinking, counter-intuitive hypotheses and steps away from single-species models. Another approach is a recommendation for fishery ecosystem planning. The North Pacific Fishery Management Council and National Marine Fisheries Service managers in that region are exploring means to integrate ecosystem information and approaches. To the degree that there is a plan and a timetable for applying these new methods, this concern could be addressed.

We recommend that the evaluation team consider current efforts to investigate concerns related to the impacts of the pollock fishery on the pelagic food web through multispecies and

ecosystem modeling, and to incorporate in the Stock Assessment and Fishery Evaluation report's Ecosystem Considerations chapter a set of indicators of ecosystem status and trends that could eventually provide an early warning of adverse changes in the ecosystem.

7. **Uncertainties regarding the impact of the pollock fishery on the protected Steller sea lion have made it difficult to implement regulatory measures that are certain to protect this listed species and that comply with U.S. environmental laws.**

Section 3.3.5.3 provides an overview of issues surrounding the controversial Steller sea lion debate. Until ongoing studies on sea lion energetics, foraging behavior, and other issues are completed, the impact of pollock fisheries on protected species will continue to be subject to disagreement regarding which (if any) of the four competing hypotheses that are commonly used to explain the reasons behind the continued decline of the western stock is correct. This issue relates to Principle 2 indicators 2.1, 2.2.1, 2.2.2, 2.3.1, 2.3.3, 2.3.4, 2.4.1, 2.4.2, 2.4.3, and 3.1.3.

It is important to note that Steller sea lion protection measures have been implemented in the pollock fishery for more than a decade, despite uncertainty regarding the impacts of the pollock fishery on this listed species. Past and current measures are detailed in Section 3.3.5.3.1.

We recommend that the evaluation team keep abreast of research developments that provide improved understanding of the impact of the pollock fishery on the protected Steller sea lion, and that fishery managers adapt regulations to address new information as it becomes available. We also believe it would benefit the management system to be more "adaptive" and less "reactive." Providing scientists and managers greater flexibility to experiment and test different hypotheses could help to resolve current uncertainties. While the fisheries management system has become more flexible and responsive to new information, the concept of actively and intentionally probing the system has, for the most part, been lost .

In some cases, this may mean pursuing incidental take permits for scientific purposes, or using other tools in the ESA to allow carefully controlled takes of protected species at risk in local situations (e.g., by fishing near some sea lion rookeries and not others). Where the knowledge payoff would be great, leading to better conservation and management of the ecosystem, ways should be found to carry out meaningful field experiments using the fishery.

8. **In setting objectives for the fishery, managers have not until recently incorporated ecosystem objectives that encompass species and habitats beyond the target stock.**

Section 3.3.2 describes the overall goals and objectives adopted for the Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fisheries. As discussed in Section 4.3.1.1, public interest in fishery management and conservation of biological diversity in the marine environment demands that managers take more recognition of elements of the system beyond those directly related to commercially targeted species. This issue relates to Principle 3 indicators 1.2 and 1.3.

The North Pacific Council has built a framework into its planning since the inception of the fishery, but has not until recently done much to hang concrete measures on that framework. For example, a primary plan objective is to promote "the efficient use of fishery resources, but not solely for economic purposes," and a secondary objective is to minimize the impacts of fishing on the environment. Yet, a review of the history of fishery management plan amendments illustrates that, with the exception of Steller sea lion protection responses, the majority of the council's actions in the past have related directly to the fishery and its economic effects. Recent actions to examine an array of competing goals and objectives in a thorough Programmatic Environmental Impact Statement is indicative of a change in thinking.

Sections 3.3.6 and 4.2.2.3 describe the current status of fishery managers' efforts to better achieve legal mandates to designate and protect essential fish habitat. As noted in these sections, the Supplemental Environmental Impact Statement needed to accomplish this goal is still under development.

We recommend that the evaluation team examine plans and timetables for the new Programmatic Environmental Impact Statement, and inquire of managers and of the applicants how the performance of new conservation approaches will be evaluated. The team should also take into consideration the actions of managers over the past several years to protect forage species and habitat, and to reduce the take of non-target species.

The evaluation team should also keep abreast of efforts to complete the Supplemental Environmental Impact Statement required to comply with legal mandates to designate essential fish habitat and to minimize the impacts of fishing on essential fish habitat. Managers should examine, under the framework that provides for the designation of habitat areas of particular concern, the potential for marine protected areas in the Bering Sea and Gulf of Alaska to conserve marine biodiversity.

9. **Traditional fishery management approaches, along with constraints on resources and unclear guidance, have weakened compliance with administrative procedures and environmental protection laws other than the M-SFCMA.**

As described in Sections 3.3.5.3 and 4.3.2.2, managers have been vulnerable to challenge that they have not complied with all applicable law and policy. Not only does failure to touch procedural bases open the system to legal challenge and all its attendant costs, but it also deprives Council and agency decision makers, as well as stakeholders, of the best possible information and alternatives analysis on which to base their decisions. This issue relates to Principle 3 indicators 2.1 and 2.2.

The NMFS has sought and received substantial resources from Congress to improve its compliance with the NEPA and other statutes. The head of the agency has made consistent public statements about his commitment to better environmental impact analyses and informed decision making. Though a plan describing the agency's actions to realize this commitment was not delivered to Congress on its December deadline, many elements of that plan are clearly underway. Improving compliance with the agency's multiple legal mandates will likely require significant changes in the structure, resources, and institutional framework of the agency that will allow managers to be responsive to this new way of doing business.

We recommend that the evaluation team find out when the NMFS' report to Congress on actions underway to improve compliance with the NEPA and other laws will be released, and

that it evaluate the adequacy of proposed improvements, and the timetable for implementing those improvements.

10. **The fishery management system responds to stakeholder concerns on an ad-hoc basis, rather than considering them in the context of the goals and values of all stakeholders over the long term.**

The current council process is very receptive and responsive to fishery participants' concerns about emerging issues. But dealing with social, cultural, economic, and ecological issues in the short term and on an ad-hoc basis often creates further problems down the road. This issue relates to Principle 3 indicators 1.3, 1.4.3, 3.1, and 3.2.

Without a framework that incorporates goal-setting for long-term social, cultural, and economic, as well as ecological objectives, fishery decision making may solve the concerns of one group while creating a very different set of problems for another stakeholder group. For example, as described in Section 3.1, concerns about the allocation of groundfish between onshore and offshore processing sectors in the 1990s led to a series of year-by-year council responses in an attempt to address the split of fishery resources between competing sectors. Inability to tackle the root of the problem - excess capacity - led to continuing economic difficulties and eventual bankruptcies. One group of stakeholders finally went to Congress to find a legislative solution for a problem that could not be addressed within the system.

Stakeholders in the groundfish fisheries have had to seek solutions outside the council process on more than one occasion. CDQs were legislated to provide access to Alaska Native communities. Cooperatives were legislated to help to reduce capacity in the offshore catcher-processor and catcher boat sectors. And alternatives for avoiding jeopardy for endangered Steller sea lions were judicially prompted. While these solutions are still within the "system" as defined by the evaluation team, they add instability and surprise to an institutional system already grappling with an unpredictable ecosystem.

The North Pacific Council employs sociologists, economists, and anthropologists, and incorporates these disciplines in its Scientific and Statistical Committee, along with natural scientists. But they look at management proposals as they arise in the biological context - how many fish in the total allowable catch in a given year. The fishery management planning system does not provide stakeholders an opportunity to articulate their values and long-term goals.

Not only would this type of planning help managers to envision a sustainable fishery that provides a constant stream of catch that does not drive the stock to low levels or harm the ecosystem. It would also help stakeholders to articulate community and cultural goals, and to be flexible enough to respond to major environmental change.

For example, sardine, anchovy, salmon, and crab fisheries have illustrated that stocks may come and go in radical ways as the result of large-scale natural variability. Whether this can happen with pollock is open to question. In any case, in the unpredictable natural world, sustainability of both the stock and the fishery may require conscious planning that allows fishermen to switch among stocks as the leading indicators of ecosystem change start flashing.

Physical oceanographers are beginning to identify the "on-off" switches that signal when regime shifts are happening. This kind of flexibility will require rethinking the permit system, boat design, and the capital structure of the fishing industry. For example, boats may need to be designed to readily accommodate several different kinds of gear instead of for maximum efficiency at catching one target stock. This could help to reduce boom and bust cycles and to lessen the economic pressures that have led to situations in many other fisheries where quotas are set at levels that are too high to sustain the fisheries over the long term.

The increased use of social and economic analysis at the Council and in the NMFS is a sign that managers are integrating these disciplines into fishery management. The proposed approach to analyze seven different competing goal sets in a new Programmatic Supplemental Environmental Impact Statement is indicative of a wider scope of inquiry than has historically been applied to the pollock fisheries.

There also are signs that the moratorium on quota regimes will be considered during reauthorization of the M-SFCMA, providing fishery managers with yet another tool that might assist them in achieving social and/or economic objectives. The Bush administration has endorsed the use of individual transferable quotas, and William Hogarth, acting assistant administrator for fisheries, said the current moratorium should be allowed to expire with little other action by Congress.

We recommend that the evaluation team assess how the fishery management system as a whole builds in mechanisms to articulate the social, cultural, and economic values and goals of diverse fishery stakeholders, and to provide for flexibility to respond to large-scale ecological change.

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TABLES AND FIGURES

Table 1: Age 3+ biomass (mt, hindcast from 2000 Model 1 analysis), pre-season catch specifications (mt), and total catches (mt, including discards) of walleye pollock in the Eastern Bering Sea, 1980-2001.

Year	Biomass	ABC	TAC	Catch
1980	3,723,000	1,300,000	1,000,000	958,279
1981	7,834,000	1,300,000	1,000,000	973,505
1982	9,021,000	1,300,000	1,000,000	955,964
1983	9,958,000	1,300,000	1,000,000	982,363
1984	9,518,000	1,300,000	1,200,000	1,098,783
1985	11,182,000	1,300,000	1,200,000	1,179,759
1986	10,277,000	1,300,000	1,200,000	1,188,449
1987	10,636,000	1,300,000	1,200,000	1,237,597
1988	9,910,000	1,500,000	1,300,000	1,228,000
1989	8,251,000	1,340,000	1,340,000	1,230,000
1990	6,473,000	1,450,000	1,280,000	1,353,000
1991	4,859,000	1,676,000	1,300,000	1,268,360
1992	7,920,000	1,490,000	1,300,000	1,384,376
1993	10,233,000	1,340,000	1,300,000	1,301,574
1994	9,285,000	1,330,000	1,330,000	1,362,694
1995	10,267,000	1,250,000	1,250,000	1,264,578
1996	8,556,000	1,190,000	1,190,000	1,189,296
1997	7,057,000	1,130,000	1,130,000	1,124,593
1998	7,448,000	1,110,000	1,110,000	1,101,165
1999	10,772,000	992,000	992,000	988,674
2000	10,490,000	1,139,000	1,139,000	1,112,100
2001	10,060,000	1,842,000	1,400,000	

Source: Witherell 2000b.

T/F-1

Table 2: Exploitable biomass (from stock synthesis model), catch specifications and total catches (including discards) of age 2+ walleye pollock in the Gulf of Alaska, 1978-2001 (in mt).

Year	Biomass	ABC	TAC	Catch
1978	2,264,000			90,820
1979	2,739,000			98,510
1980	3,195,000			110,100
1981	3,854,000			139,170
1982	3,987,000			168,690
1983	3,364,000			215,570
1984	2,719,000		234,960	307,400
1985	2,004,000		293,250	284,820
1986	1,615,000	116,600	133,280	93,570
1987	1,697,000	112,000	108,000	69,540
1988	1,614,000	93,000	93,000	65,625
1989	1,465,000	75,375	72,200	78,220
1990	1,250,000	73,400	73,400	90,490
1991	1,381,000	133,400	133,400	107,500
1992	1,728,000	99,400	87,400	93,900
1993	1,582,000	160,400	114,400	108,600
1994	1,338,000	109,300	109,300	110,890
1995	1,128,000	65,360	65,360	73,250
1996	941,000	54,810	54,810	50,200
1997	1,000,000	79,980	79,980	89,800
1998	964,000	130,000	124,730	125,471
1999	767,000	100,920	100,920	93,380
2000	577,000	100,000	100,000	71,877
2001	699,000	105,810	95,875	

Source: DiCosimo and Kimball 2001.

T/F-2

Table 3. Geographic distribution of walleye pollock stocks.

Stock	Characteristics
Southeast Alaska-Canada	Small stock, minor fisheries
Western-Central Gulf of Alaska (GOA)	Variable stock, 50-200 thousand mt catch
Eastern Bering Sea (EBS)	Large stock, 1-2 million mt catch Aleutian
Basin	Variable stock (0.1-1.4 million mt catch) Aleutian
Islands	Small stock, minor fisheries

Source: Bailey *et al.* 1999, modified from Wespestad 1996.

Table 4. Summary status of pollock stocks in the U.S. Exclusive Economic Zone.

Stock	Characteristics
Eastern Bering Sea	Estimated biomass in 2000 age 3+ = 7.7 million mt U.S. and Russian EIT surveys indicate that the EBS stock goes into the Russian EEZ. Russians indicate 5% of EBS stock in the Navarin shelf region. NMFS and UW collaborating on DNA study (Ianelli *et al.* 2000, 1.8.3.). ABC basis Tier 1
Aleutian Islands	Estimated biomass in 2000 age 3+ = 106,000 mt No directed fishing for several years? Stock definition confounded with EBS - unlikely to represent a discreet stock (Ianelli *et al.* 2000, 1.15.); ABC basis Tier 5
Aleutian Basin-Bogoslof Island	Biomass in 2000 age 3+ 301,000 mt Closed since 1991; ABC basis Tier 5 current ABC 8,470 mt; more likely than the Aleutian Islands to be discreet from EBS stock, but still may not be - very few young fish, maybe recruiting from elsewhere (Ianelli *et al.* 2000, 1.16.). Contiguous with the Donut Hole
Gulf of Alaska	Biomass in 2000 age 3+ 616,710 mt; this is an all time low ABC = 100,000 mt

Table 5. Estimated pollock catch retained and discarded, as percent of total pollock catch in all BSAI fisheries from 1990-1999 (mt).

Year	Total Pollock Catch	Retained	Discarded	Discards as % of Total Catch
1990	1,534,218	1,416,711	117,507	7.7%
1991	1,482,061	1,318,966	163,095	11%
1992	1,213,185	1,091,919	121,266	10%
1993	1,383,732	1,271,914	111,819	8.1%
1994	1,422,094	1,312,892	109,202	7.7%
1995	1,339,728	1,228,654	98,542	7.4%
1996	1,222,339	1,145,133	77,206	6.3%
1997	1,150,533	1,056,316	94,217	8.2%
1998	1,124,987	1,108,106	16,881	1.5%
1999	990,855	961,362	29,492	3.0%

Source: Ianelli *et al.* 2000.

Table 6. Estimated pollock catch retained and discarded, as percent of total pollock catch in all Gulf of Alaska fisheries from 1991-1999 (mt).

Year	Total Pollock Catch	Retained	Discarded	Discards as % of Total Catch
1991	100,488	91,181	9,308	9.3%
1992	90,857	77,812	13,045	14.4%
1993	108,908	100,645	8,264	7.6%
1994	107,355	101,028	6,306	5.9%
1995	72,618	64,759	7,859	10.8%
1996	51,263	46,107	5,156	10.1%
1997	90,130	82,888	7,242	8.0%
1998	125,098	124,077	1,022	0.8%
1999	95,590	93,643	1,947	2.0%

Source: Dorn *et al.* 2000.

T/F-4

Table 7. Estimated pollock and non-target groundfish catch retained and discarded in directed BSAI pollock fisheries from 1997-2000 (mt).

Year	Total Catch	Retained			Discarded			Discards as % of Total Catch
		Pollock	Non-Target Groundfish	Total Retained	Pollock	Non-Target Groundfish	Total Discarded	
1997	1,097,657	1,050,833	5,318	1,056,152	28,712	12,794	41,505	3.78
1998	1,022,374	1,002,485	9,417	1,011,902	4,258	6,214	10,472	1.02
1999	957,713	942,761	5,249	948,010	5,999	3,705	9,704	1.01
2000	1,109,250	1,090,029	7,040	1,097,069	1,424	10,757	12,181	1.10

*This table represents discards of pollock and non-target groundfish only. See Table 5 for data on prohibited species.
*Directed pollock fishery defined by catch composition, not reported gear type.
*Numbers may not sum perfectly due to rounding.

Source: National Marine Fisheries Service, Alaska Fishery Science Center, December 2001.

T/F-5

Table 8. Estimated pollock and non-target groundfish catch retained and discarded in directed Gulf of Alaska pollock fisheries from 1997-2000 (mt).

Year	Total Catch	Retained			Discarded			Discards as % of Total Catch
		Pollock	Non-Target Groundfish	Total Retained	Pollock	Non-Target Groundfish	Total Discarded	
1997	88,284	82,089	936	83,025	4,322	936	5,258	5.96
1998	125,924	123,413	1,073	124,486	833	604	1,438	1.14
1999	96,688	92,805	1,825	94,630	1,197	861	2,058	2.13
2000	72,969	69,853	1,774	71,627	626	716	1,342	1.84

*This table represents discards of pollock and non-target groundfish only. See Table 5 for data on prohibited species.
*Directed pollock fishery defined by catch composition, not reported gear type.
*Numbers may not sum perfectly due to rounding.

Source: National Marine Fisheries Service, Alaska Fishery Science Center, December 2001.

T/F-6

Table 9. Average rate of incidental catch of halibut, crab and salmon in the directed BSAI pollock fishery (1997-2000).

Year	kg halibut / mt groundfish**	# crab / mt groundfish			# salmon / mt groundfish**		
		Red king	Tanner	Total crab	Chinook	Other	Total salmon
1997	0.243	0.000	0.026	0.026	0.002	0.061	0.062
1998	0.345	0.014	0.056	0.070	0.004	0.063	0.066
1999	0.180	0.000	0.003	0.003	0.008	0.069	0.077
2000	0.112	0.000	0.001	0.001	0.004	0.057	0.062

*Directed pollock fishery defined by catch composition, not reported gear type.
**Data do not distinguish between catch discarded and catch donated to disadvantaged individuals through the Prohibited Species Donation Program.

Source: NMFS 2001.

Table 10. Average rate of incidental catch of halibut, crab and salmon in the directed Gulf of Alaska pollock fishery (1997-2000).

Year	kg halibut / mt groundfish**	# crab / mt groundfish			# salmon / mt groundfish**		
		Red king	Tanner	Total crab	Chinook	Other	Total salmon
1997	0.463	0.000	0.008	0.008	0.109	0.027	0.135
1998	0.359	0.000	0.003	0.003	0.080	0.026	0.106
1999	0.347	0.000	0.001	0.001	0.273	0.021	0.295
2000	1.087	0.000	0.025	0.025	0.251	0.101	0.352

*Directed pollock fishery defined by catch composition, not reported gear type.
**Data do not distinguish between catch discarded and catch donated to disadvantaged individuals through the Prohibited Species Donation Program.

Source: NMFS 2001.

Table 11. Procedural history of the Steller sea lion debate.

Date	Action
Late 1970s	NMFS obtains first reliable data on counts of Steller sea lions (SSL); report total of approximately 109,000 animals.
1978, 1981	NMFS approves and implements the North Pacific Fishery Management Council's Fishery Management Plans (FMP) for the Gulf of Alaska (GOA) and Bering Sea Aleutian Islands (BSAI) Groundfish Fisheries; Environmental Impact Statements (EIS) for the FMPs are prepared and approved.
1980s	NMFS data indicate precipitous decline of sea lions.
5/1988	NMFS publishes an advanced notice of proposed rulemaking to designate the SSL in Alaska as "depleted" under the MMPA based on the 1988 Status Report.
10/1988	Congress amends the MMPA; includes a provision directing NMFS to follow the recommendation of the Marine Mammal Commission that it designate the SSL as "depleted" and prepare a conservation plan by 12/31/1990.
11/1989	Environmental Defense Fund and 17 other environmental organizations petition NMFS for emergency rule listing all SSL populations in Alaska as endangered. Population estimated for Kenai to Kiska area to be 25,000.
4/1990	NMFS designates the SSL as a threatened species on an emergency basis under the ESA, following severe declines at rookeries throughout much of the GOA and Aleutian Islands region.
6/1990	NMFS initiates ESA Section 7 Consultation on all federally-managed fisheries within the SSL's range. No jeopardy or adverse modification is found.
Fall 1990	NMFS and the North Pacific Council propose to increase 1990 catch levels for BSAI and GOA groundfish fisheries by 80 percent for 1991.
11/1990	NMFS publishes final listing of SSL as a threatened species (50 FR 49204). Western population of sea lions estimated at 28,000 animals.
6/1991	NMFS completes Section 7 Consultation on the 1991 GOA Pollock total allowable catch (TAC) specification and concludes that the fishery, if operated outside of 10 nautical mile no-trawl zones around GOA rookeries and with spatial and temporal TAC allocations to prevent localized depletions, was not likely to jeopardize or adversely modify habitat.
7/1991	Greenpeace sues NMFS alleging violations of the NEPA and Section 7 of the ESA in approving a revised pollock TAC for 1991 that was 41 percent higher than the 1990 TAC based on an environmental assessment (EA) finding no significant impact and a biological opinion (BiOp) concluding no jeopardy.
10/1991	Federal district court concludes nothing in administrative record shows NMFS violated duties under either ESA or NEPA; decisions not to prepare an EIS or undertake further studies before issuing "no jeopardy" finding not arbitrary or capricious; NMFS adequately assessed environmental impact of action approving the TAC. Greenpeace appeals.
1/1992	NMFS publishes final rules implementing Amendments 20 and 25 to the GOA and BSAI groundfish FMPs, including as SSL protective measures buffer zones, 10-nautical miles.

T/F-8

Date	Action
12/1992	Federal Court of Appeals upholds lower court decision in *Greenpeace v. Franklin*. NMFS decision not to prepare an EIS in setting the pollock TAC was based on adequate scientific data.
3/1993	NMFS issues final rule implementing an FMP regulatory amendment to expand 20-nautical mile the trawl fishery closure around the Ugamak Island SSL rookery in the eastern Aleutian Islands during the pollock roe fishery season to better protect the foraging zone of sea lion pups as indicated by satellite tracking data.
8/1993	NMFS publishes final rules defining SSL critical habitat, including the marine areas within 20 nautical miles of approximately 40 rookeries and 82 haulouts west of 144 degrees W longitude as well as three special at-sea foraging areas (58 FR 45269).
1996	NMFS observes that SSL population has declined by 80 percent from the late 1970s. National Research Council publishes "The Bering Sea Ecosystem," concluding that the "cascade hypothesis" is the most likely explanation of events observed in the Bering Sea ecosystem since 1945, causing pollock to dominate the ecosystem and making forage fish with higher nutritional value relatively scarce, leading to the declines of marine mammals in the system.
5/1997	NMFS publishes final rule recognizing two separate populations ("distinct population segments") of SSL under the ESA and reclassifying the western population (west of 144 degrees W longitude) as endangered, based on continued population declines.
5/1998	NMFS approves FMP amendment and EA for BSAI FMP to reapportion total allowable catch of Atka mackerel and reduce fishery effects on SSLs.
12/1998	NMFS Office of Protected Resources prepares BiOp 1 on BSAI and GOA groundfish fisheries and concludes that the BSAI and GOA pollock trawl fisheries, as projected for 1999 through 2002, were likely to jeopardize the endangered western population of SSLs and adversely modify critical habitat. NMFS also prepares and issues a final supplemental EIS (SEIS) for the federally-managed groundfish fisheries off Alaska, evaluating the environmental effects of alternative TAC levels. NMFS prepares an additional BiOp on the effects of the 1999 groundfish fisheries on endangered species and habitat (1998 - 2 BiOp). Greenpeace *et al.* challenge the opinion as too narrow in scope.
5/1999	U.S. Congress, House Subcommittee on Fisheries Conservation, Wildlife and Oceans holds oversight hearing on SSL research.
7/1999	Federal district court judge Zilly rules that the 1998 SEIS on Alaska groundfish fisheries was too narrow in scope and failed to consider cumulative effects and dramatic changes in the North Pacific ecosystem and was therefore legally inadequate; orders NMFS to prepare EIS that includes a reasonable set of programmatic management alternatives, not just alternative harvesting levels. The revised programmatic EIS is to incorporate results from the consultations under Section 7 of the ESA on the likely effect of the authorized fisheries on listed species and their habitats.
8/1999	Judge Zilly remands the 1998 BiOp to NMFS to prepare and issue revised final reasonable and prudent alternatives, which NMFS issues in 10/1999. Greenpeace and the other plaintiffs challenge the revised reasonable and prudent alternatives (RPA).

T/F-9

Date	Action
10/1999	NMFS publishes notice of intent for scoping meetings on developing a programmatic SEIS (64 FR 53305). Comment period through 11/15/1999.
11/1999	NMFS issues notification of draft alternatives for the SEIS and extends the scoping and comment period through 12/15/1999 (64 FR 59730).
12/1999	NMFS prepares BiOp on TAC specifications for BSAI and GOA groundfish.
1/2000	Judge Zilly finds NMFS is in continuing violation of the ESA. The 1998-2 BiOp was not comprehensive and failed to analyze the full scope of the FMPs and all the potential cumulative effects of the fisheries.
4/2000	NMFS publishes report on Alaska groundfish fisheries SEIS scoping with a comment period through 5/1/2000 (65 FR 18074).
7/2000	Judge Zilly issues an injunction prohibiting fishing for groundfish with trawl gear in federal waters within SSL critical habitat west of 144 degrees W longitude until NMFS issues a legally adequate comprehensive BiOp analyzing the full scope of the FMP including measures determining where and when fishing will take place.
11/2000	NMFS issues court-ordered comprehensive BiOp, incidental take statement and RPA, concluding that the Alaska groundfish fisheries under existing FMP management framework jeopardize the SSL and adversely modify its critical habitat due to competition for prey and through disruption of its prey field. The North Pacific Council reviews the BiOp at its meeting and rejects the findings, asking its scientific committee to review the opinion and prepare a full report by 2/2001.
12/2000	Congress uses appropriations bill to require support for SSL scientific studies and outline a three-step phase-in process for implementation of the comprehensive BiOp's RPA, including a requirement that the restrictions are implemented as fishery management provisions through the regional council process.
1/2001	NMFS publishes emergency rules (66 FR 7275) establishing SSL protection measures for the 2001 Alaska groundfish fisheries including a one-year phase-in of the RPA in the comprehensive BiOp. NMFS releases draft programmatic SEIS on federal groundfish fisheries off Alaska, evaluating all activities authorized and managed under the FMPs, including significant cumulative effects of environmental and management changes in the groundfish fisheries, and an analysis of reasonable management alternatives and their impacts (66 FR 8788).
2/2001	North Pacific Council's Scientific and Statistical Committee releases a review of the comprehensive BiOp, concluding it is scientifically deficient, unduly negative towards fisheries, and based on unsubstantiated opinions and facts, lacking scientific balance. North Pacific Council appoints RPA Committee to recommend SSL conservation measures for summer 2001.

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Date	Action
3/2001	NMFS extends comment period on draft SEIS to 6/25/2001 (66 FR 16226). NMFS publishes corrections to emergency interim rule on SSL protection measures (66 FR 15656). NMFS publishes amendments to emergency interim rule, relaxing restrictions on vessels fishing for groundfish off Alaska with jig gear and on vessels less than 60 ft length overall fishing for Pacific cod with hook-and-line or pot gear in the BSAI (66 FR 17083, March 29, 2001).
4/2001	North Pacific Council adopts RPA recommendations and requests emergency rule for SSL protection measures by June.
5/2001	NMFS extends comment period on the draft SEIS to 7/25/2001 (66 FR 22551).
6/2001	NMFS publishes amendments to emergency interim rule implementing 2001 SSL protection measures and harvest specifications for the groundfish fisheries off Alaska. These modifications prohibit directed fishing for Pacific cod by specified vessels until 7/17/2001. Effective 6/10/2001 (66 FR 31845).
7/2001	NMFS receives more than 20,000 comments on draft programmatic SEIS, including many from environmental group plaintiffs who claim the list of alternatives does not provide specific protections for the ecosystem. NMFS publishes correction to emergency interim rule; Final 2001 Harvest Specifications (66 FR 34852). NMFS amends and corrects the emergency interim rule that implements the 2001 SSL protection measures and 2001 harvest specifications and extends through 12/2001 (66 FR 37167).
8/2001	NMFS releases revised draft BiOp regarding the impact of the groundfish harvest on endangered SSLs, with comment period through 9/2001. NMFS publishes draft SEIS on SSL protective measures.
9/2001	Correction to the 7/17/2001 emergency interim rule and its 8/22/2001 correction by correcting SSL protection areas for the Pacific cod directed fishery (66 FR 48371).
11/2001	NMFS publishes notice of intent to revise the draft programmatic SEIS, and pushes off original intent to complete document until 9/2003 at the earliest. NMFS publishes final SEIS on SSL protection measures.
1/2002	Emergency Rule for SSL protection measures and TAC specifications. Comment period through 2/7/2002 (67 FR 956).

Source: The material in this box was updated and adapted from a timeline provided in "The Best Available Science: Proceedings from a workshop on the role of science in marine conservation law," Honolulu, Hawaii March 9-10, 2001. Sponsored by Marine Law Institute, University of Maine School of Law. Available online at http://www.usm.maine.edu/~rieser/ SSL/SSL_chronology.html.

T/F-11

Table 12. U.S. Fisheries Observer Coverage.

Fishery	Authority	Coverage	Funding
New England Sink Gillnet	MMPA	<5%	Federal
New England Scallop Dredge	M-SFCMA	20%	Industry Mid-
Atlantic Midwater Trawl	MMPA	<1%	Federal Mid-
Atlantic Coastal Gillnet	MMPA	<5%	Federal South
Atlantic Shark Driftnet	MMPA/MSA/ESA*	50-100%	Federal Atlantic
Pelagic Longline	M-SFCMA/ESA*	3-5%	Federal Gulf of Mexico
Shark Longline	M-SFCMA	2%	Federal Gulf of Mexico Otter
Trawl	Voluntary	<1%	Federal Pacific Whiting Trawl
Voluntary	100%	Industry West Coast Groundfish	
(planned)	(10%)	Federal Monterey Bay Halibut Setnet	
MMPA	25%	Federal Swordfish and Thresher Shark Drift Gillnet	
MMPA	25%	Federal Hawai'i Swordfish and Tuna Longline	M-
SFCMA/ESA*	20%	Federal Bering Sea Groundfish	M-
SFCMA	30-100%	Industry Aleutian Islands Groundfish	M-
SFCMA	30-100%	Industry Gulf of Alaska Groundfish	M-
SFCMA	30-100%	Industry Salmon Setnet and Driftnet	MMPA
1%	Federal		

*Observers authorized to monitor interactions with ESA-listed species.

Source: Presentation to Marine Federal Fisheries Advisory Committee, April 24, 2001, Victoria R. Cornish, National Observer Program, National Marine Fisheries Service.

Table 13. Current requirements for observer coverage in the North Pacific groundfish fishery.

Fleet/Industry Component		Coverage
Catcher / processor or catcher vessel	125 feet (38.1 meters) in length overall (LOA) or longer	Must carry a NMFS-certified observer at all times while fishing for groundfish, except for vessels fishing for groundfish with pot gear as provided for below.
	Equal to or greater than 60 feet (18.3 meters) LOA but less than 125 feet (38.1 meters) LOA	Must carry a NMFS-certified observer during at least 30% of its fishing days in each calendar quarter in which the vessel participates for more than 3 fishing days in a directed fishery for groundfish. Each vessel that participates for more than 3 fishing days in a directed fishery for groundfish in a calendar quarter must carry a NMFS-certified observer during at least one fishing trip during that calendar quarter for each of the groundfish fishery categories defined in regulations 50 CFR part 627.27(c)(1)(iv) in which the vessel participates.
Catcher / processor or catcher vessel fishing with hook-and-line gear	Equal to or greater than 60 feet (18.3 meters) LOA but less than 125 feet (38.1 meters) LOA	Must carry a NMFS-certified observer during at least one fishing trip in the Eastern Regulatory Area of the Gulf of Alaska during each calendar quarter in which the vessel participates in a directed fishery for groundfish in the Eastern Regulatory Area.
Catcher / processor or catcher vessel fishing with pot gear	Equal to or greater than 60 feet (18.3 meters) LOA	Must carry a NMFS-certified observer during at least 30% of its fishing days in each calendar quarter in which the vessel participates for more than 3 fishing days in a directed fishery for groundfish. Each vessel that participates for more than 3 fishing days in a directed fishery for groundfish in a calendar quarter using pot gear, must carry a NMFS-certified observer during at least one fishing trip during that calendar quarter for each of the groundfish fishery categories defined in regulations 50 CFR part 627.27(c)(1)(iv) in which the vessel participates.
Mothership processor vessels of any length	Processes 1,000 mt or more, calculated in round weight equivalents, of groundfish during a calendar month	Must have a NMFS-certified observer on board the vessel each day it receives or processes groundfish during that month.

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Fleet/Industry Component		Coverage
	Processes from 500 mt to 1,000 mt, calculated in round weight equivalents, of groundfish during a calendar month	Must have a NMFS-certified observer on board the vessel at least 30% of the days it receives or processes groundfish during that month.
Shoreside processing facilities	Processes 1,000 mt or more, calculated in round weight equivalents, of groundfish during a calendar month	Must have a NMFS-certified observer present at the facility each day it receives or processes groundfish during that month.
	Processes 500 mt to 1,000 mt, calculated in round weight equivalents, of groundfish during a calendar month	Must have a NMFS-certified observer present at the facility at least 30% of the days it receives or processes groundfish during that month.

T/F-14

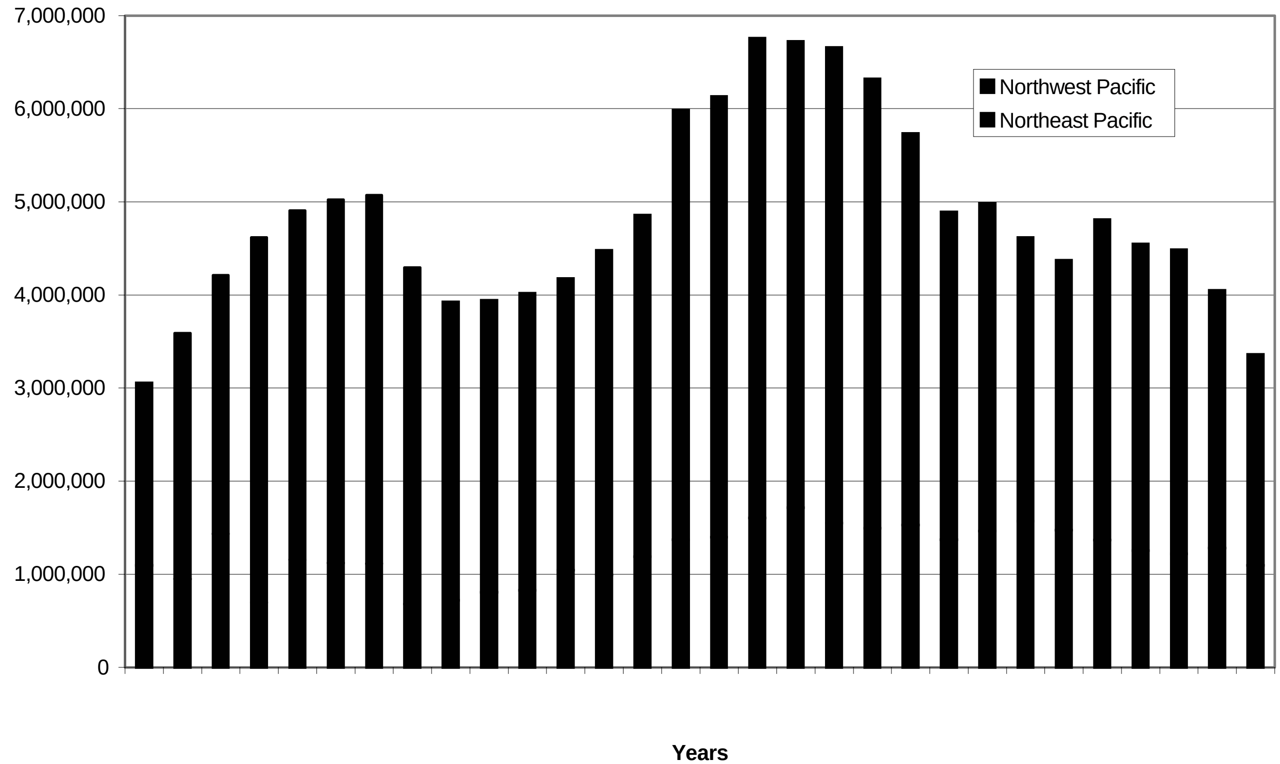

Figure 1. Total walleye pollock catch in the northwest and northeast Pacific, 1970-1999.

Source: Froese and Pauly 2001.

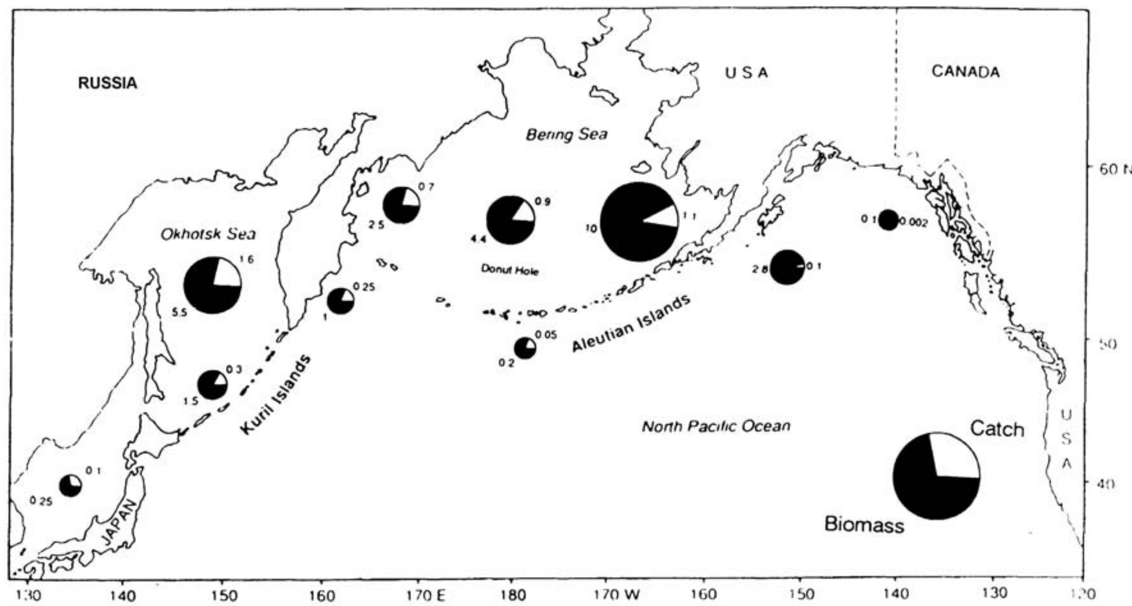

Figure 2. Historical average catches and estimated biomass of walleye pollock in million mt by stock or major fishing areas.

Source: After Wespestad 1993, sources cited include Asian catch and biomass data, N. Fedeev, TINRO, Vladivostok, personal communication; Bering Sea-Aleutian Islands, Wespestad and Dawson (1992); West central Gulf of Alaska and eastern Gulf of Alaska-Washington, A. Hollowed, Alaska Fisheries Center, personal communication.

T/F-16

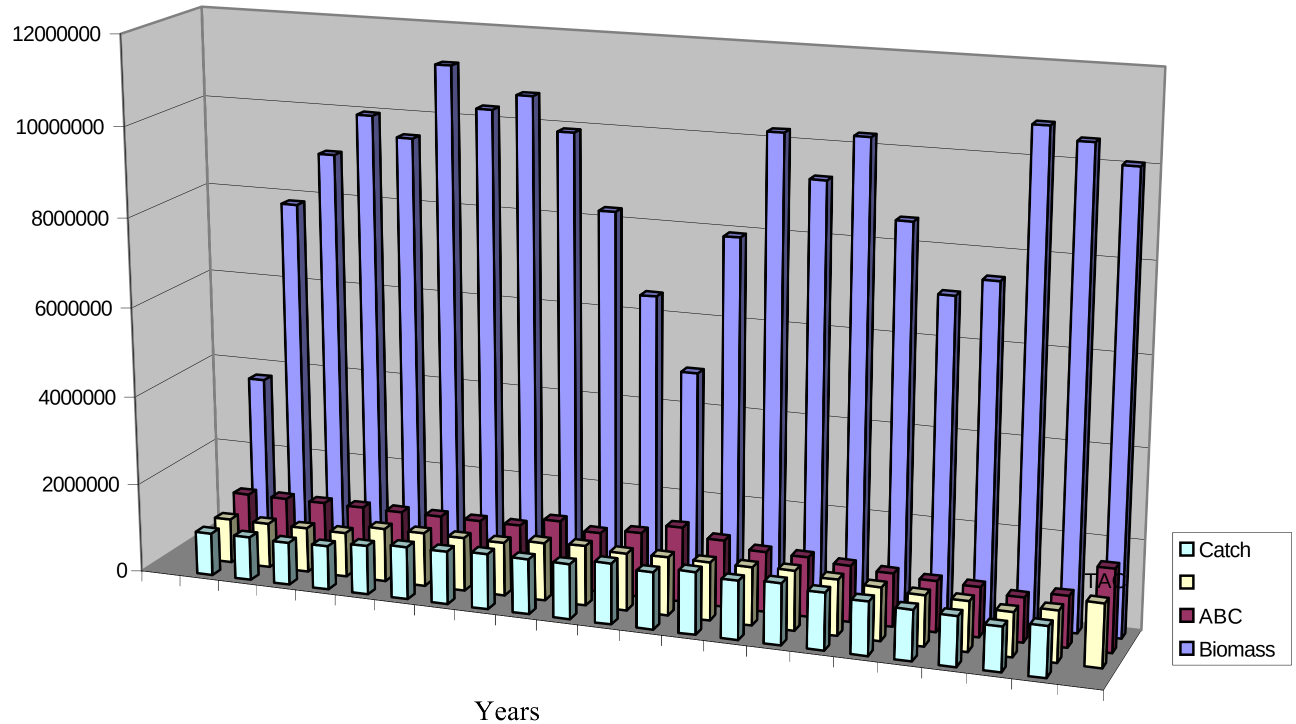

Figure 3. Age 3+ biomass (hindcast from 2000 Model 1 analysis), pre-season catch specifications, and total catches (including discards) of walleye pollock in the Eastern Bering Sea, 1980-2001.

Source: Adapted from Witherell 2000b, p. 1.

T/F-17

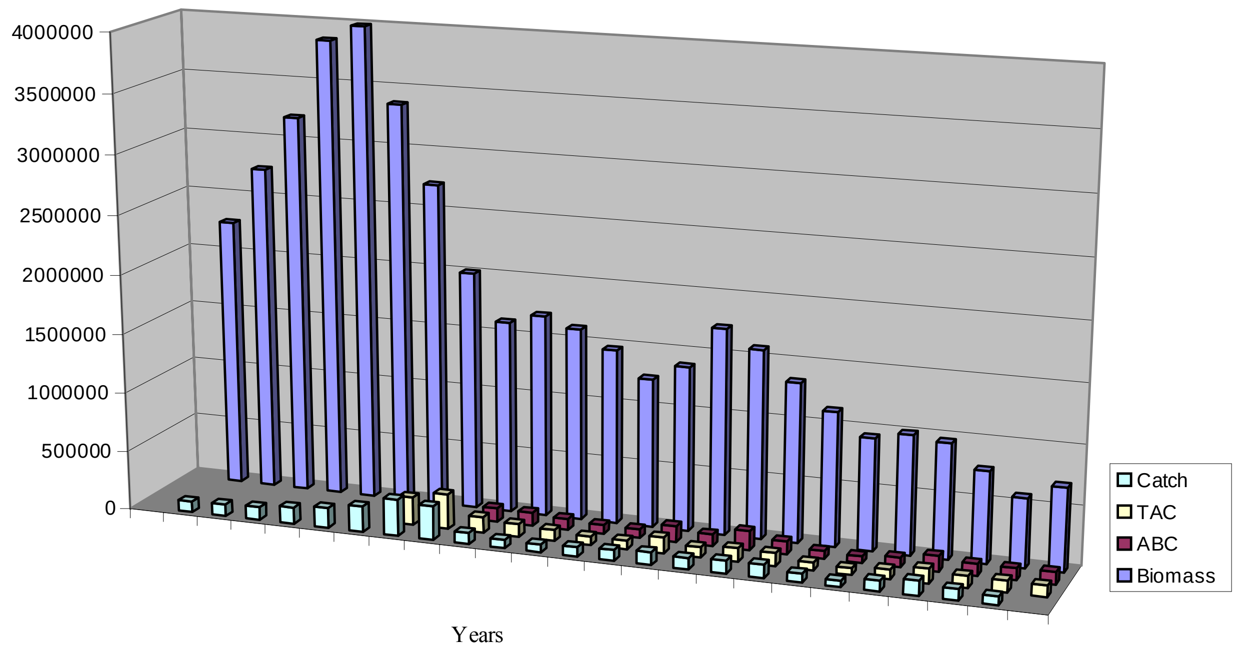

Figure 4. Exploitable biomass (from stock synthesis model), catch specifications and total catches (including discards) of age 2+ walleye pollock in the Gulf of Alaska, 1978-2001.

Source: Adapted from DiCosimo and Kimball 2001, p. 1.

T/F-18

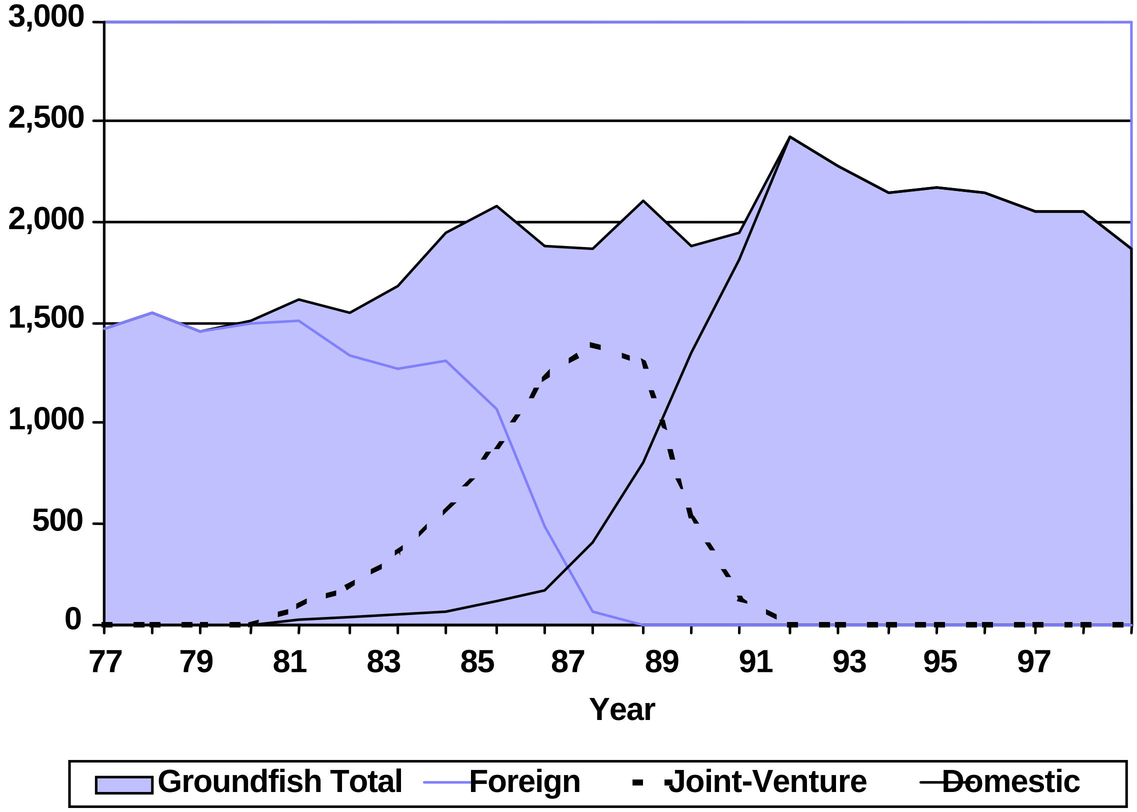

Figure 5. Foreign, joint venture and domestic groundfishing and processing 1977-1988.

Source: From Northern Economics Sector and Regional Profiles of the North Pacific Groundfish Fisheries. Economic Status of the Groundfish Fisheries off Alaska, 1991 and 1995, R.K. Kinoshita, et al, April 1997; and NMFS and NMFS Blend Data, June 2000.

T/F-19

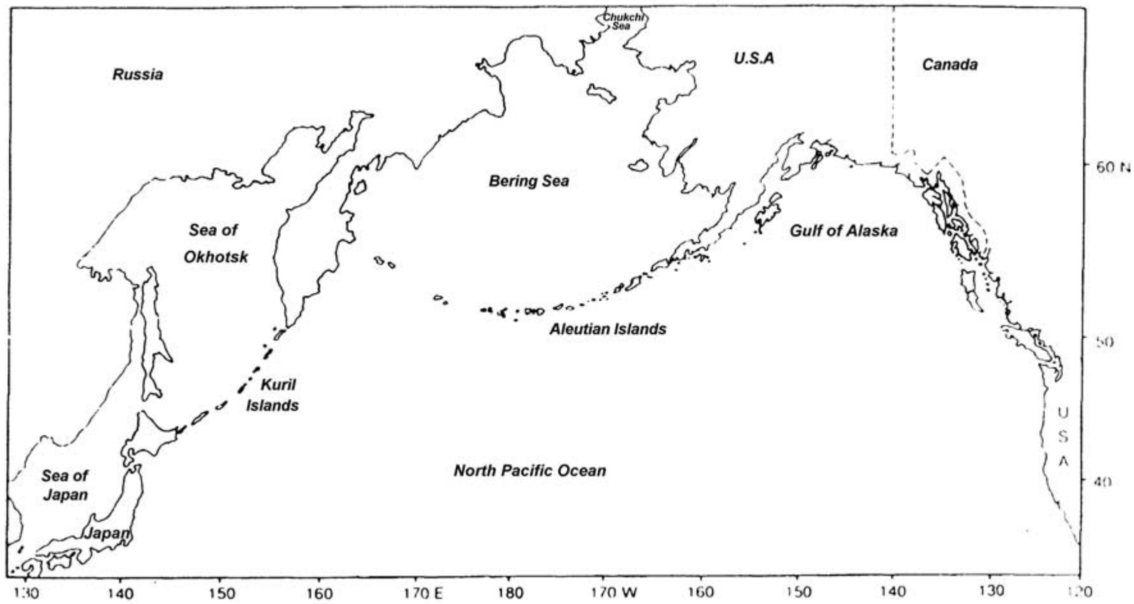

Figure 6. The North Pacific.

Source: Modified from Wespestad (1993).

T/F-20

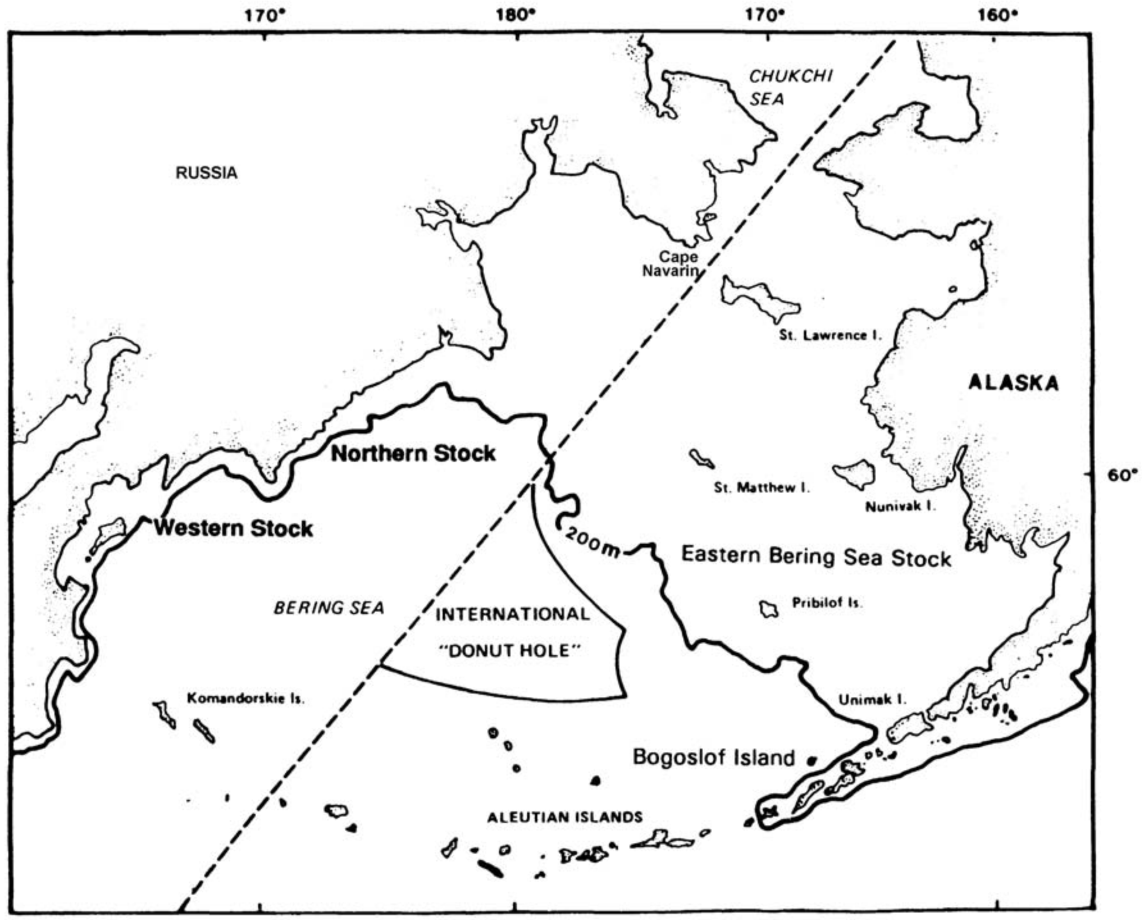

Figure 7. Major features of the Bering Sea and walleye pollock stocks.

Source: Modified from Wespestad 1993.

T/F-21

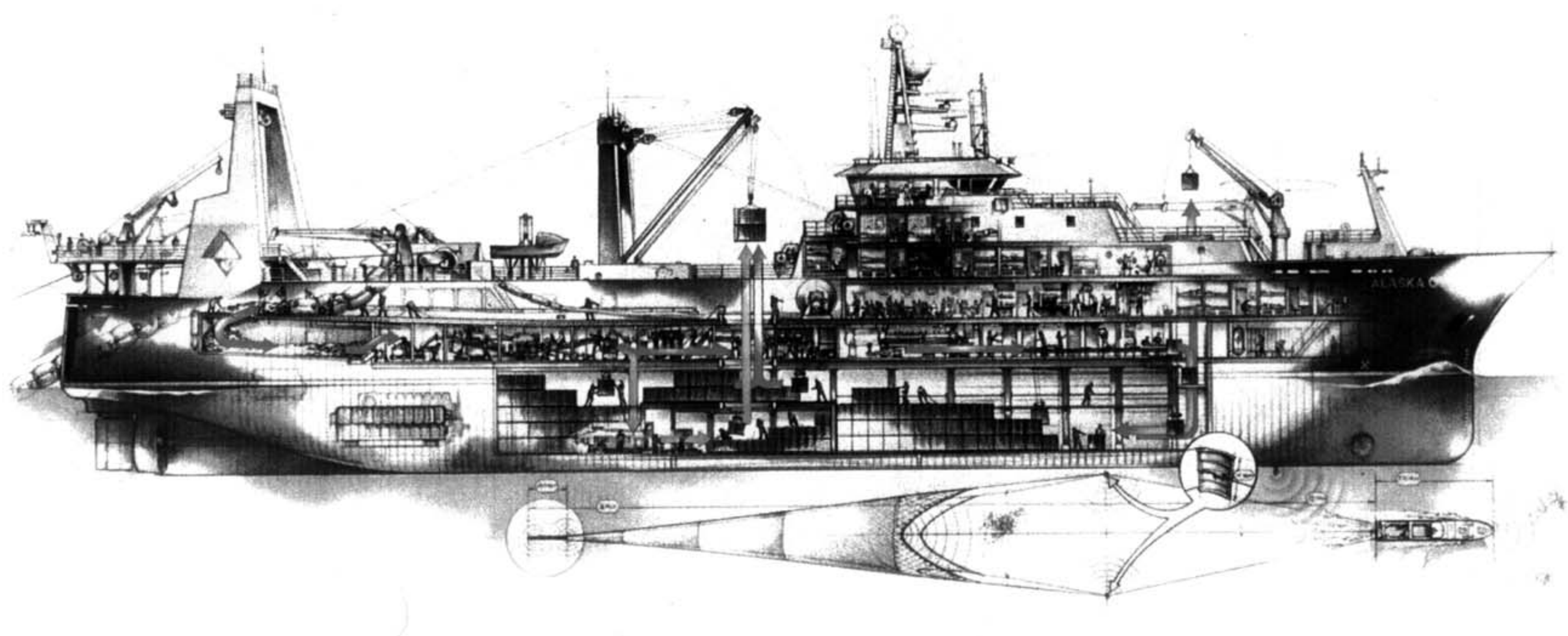

Figure 8. Schematic of a Catcher-Processor Vessel

At the far left, the trawl is winched aboard up the open stern ramp. The catch is dumped out of the cod end into a refrigerated seawater hold. Fish are then pulled out of the hold into the factory line where they are either filleted or minced for surimi. Freezer storage in the hold of the ship keeps blocks of product until it is offloaded by cranes. The inset drawing shows the deployment of the net behind the vessel as it is towed. Trawl doors designed like airplane wings to provide lift keep the net open. Electronics detect not only schools of fish, but monitor fish in the opening of the net, and also the behavior of the net as it is towed.

Source: At-Sea Processors Association 1998

T/F-22

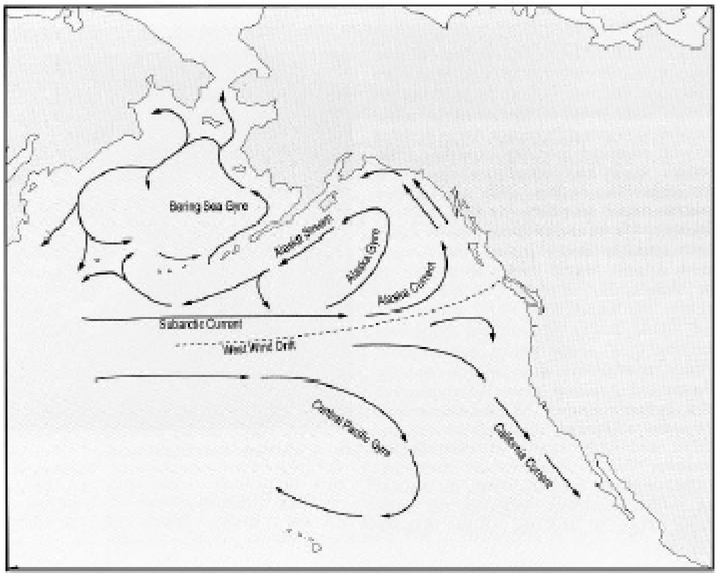

Figure 9. General surface circulation and major current systems of the North Pacific Ocean.

Source: NMFS 2001a.

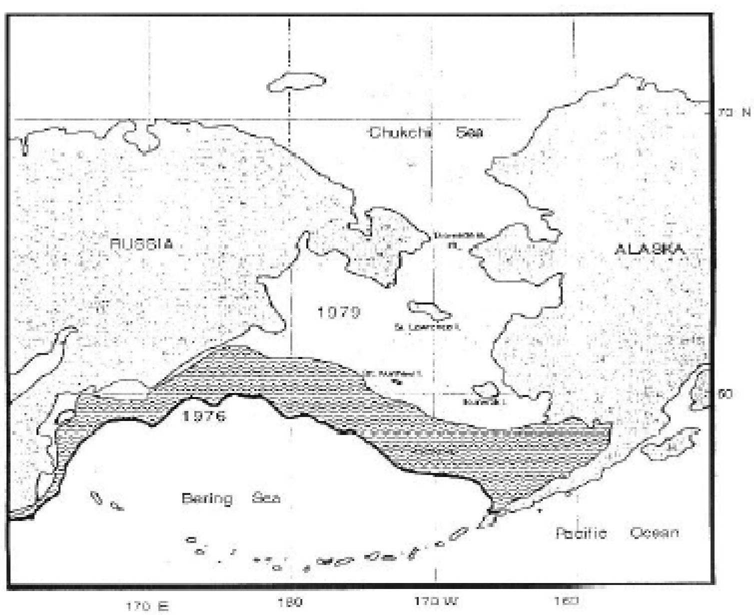

Figure 10. Maximum (1976) and minimum (1979) extent of sea ice in the Bering Sea in recent years.

Source: NMFS 2001a.

T/F-23

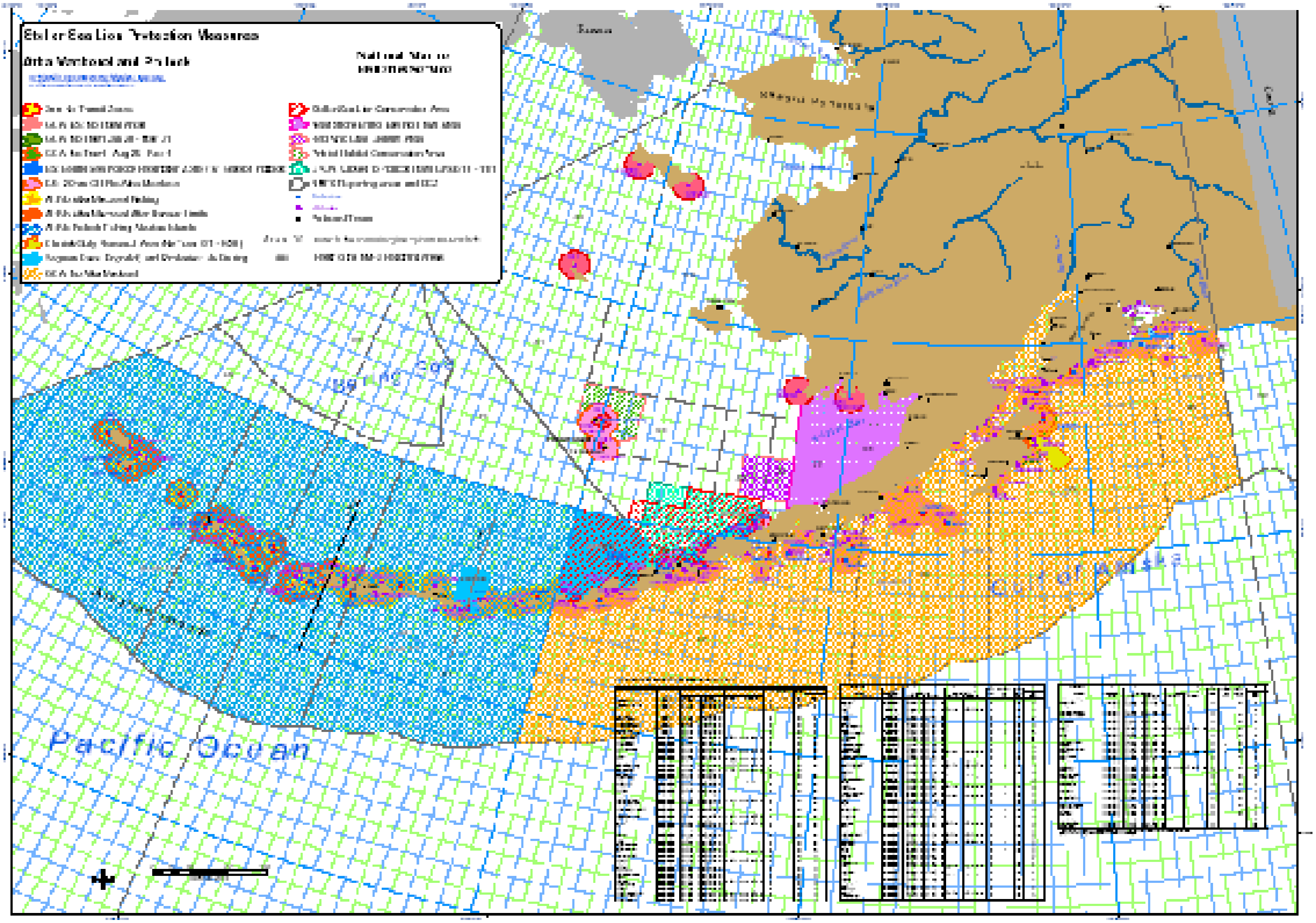

Figure 11. Map of areas where pollock and Atka mackerel fishing is restricted to protect Steller sea lions.

Source: NMFS 2001d.
*The original (and larger) version of this map is available online at http://www.fakr.noaa.gov/protectedresources/stellers/maps/Atka_Pollock.pdf. A comprehensive list of the mapped areas (including lat. and long. boundaries) is available online at http://www.fakr.noaa.gov/sustainablefisheries/sslertables/2002table22.pdf.

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APPENDICES

Appendix A: Comments to Scott Burns and Chet Chaffee, November 2001

M E M O R A N D U M

TO: Scott Burns, WWF
FR: Suzanne Iudicello Martley
RE: Pollock Certification Performance Indicators

9 November 2001

Following this cover are comments related to the "advisory" sent on October 21 by Chet Chaffee of Scientific Certification Systems regarding the certification process for pollock. These comments have been prepared by Graeme Parkes, Brock Bernstein and myself. We are continuing to work on the overall comments, now in light of these performance indicators.

A-1

Comments on Performance Indicators and Scoring Guidelines for MSC Evaluation of Pollock Fisheries in the Bering Sea and Gulf of Alaska

A general comment: Under the MSC, the certifiers are given some latitude to develop performance indicators and scoring guidelines for the fishery being certified. This is presumably a reflection of the relative infancy of the certification standard. One would hope that the MSC is working towards a standard set of indicators and scoring guidelines that are comprehensive, robust, yet flexible enough to be applied to all fisheries seeking certification with little or preferably no modification between applications. Otherwise the certification tends to lose its "standard" and it becomes increasingly difficult to compare performance across certified fisheries and accredited certifying organisations.

Also in general, the indicators should have unique numbers. As it is, there are multiple indicators with the same number, which makes it confusing when referring to individual indicators. This could be accomplished by including the Principle number in the indicator number.

Principle 1.

Criterion 1 Catch levels

According to the team's stated interpretation, under MSC criterion 1 they intend to focus on "1) management of the target species and 2) management of by-product species (retained commercial species that are not the prime target of the fishery). Other aspects of "associated ecological community" are dealt with under Principle 2."

It would be better if the management procedure itself included explicit consideration of the "ecological community" rather than it being looked at as something outside the assessment of catch limits for the target species. Example measures arising from this approach include explicit catch limits for non-target, retained and discarded species (which can affect the catch limits for the target species), and a target escapement of the target species that takes into account the needs of predators (e.g. the CCAMLR assessment of krill).

Sub-criteria listings

The nesting of sub-criteria is quite well done and, once you can visualise the hierarchy (which is rather difficult at first glance), it makes reasonable sense (noting as above that I disagree with the interpretation under Criterion 1 that the "associated ecological community" should be dealt with separately). This nested structure highlights the much greater emphasis being placed on the target species compared to the retained by-catch. Pollock is a pretty clean fishery, but given the volume of the catch, it only takes a small percentage of by-catch to add up to a lot in absolute terms. There perhaps ought to be more of a balance in detail between the standards being set for the knowledge, assessment and management of the target species and those of the by-catch (both retained and discarded) species.

A-2

Sub-criteria 1.1.1 (catch control rules) and 1.1.2 (stocks are not depleted)

There needs to be a more explicit link between these indicators and their scoring guideposts and those under Criterion 2 (strategies to promote recovery of depleted stocks). Indicator 2.1 refers to threshold stock levels, but there is little mention of "target" stock sizes or fishing mortality rates under sub-criterion 1.1.1 and how the two levels (target and threshold) might operate in a management procedure incorporating decision rules. Indicators under sub-criterion 1.1.2 refer to limit reference points, which are presumably thresholds? There needs to be some clarification of the terminology (see attached discussion from a recent MRAG paper on SPR).

Indicator 1.1.1.1

Attempts to develop multispecies models and include their results in the stock assessment means that "assessment methods can vary from year to year" as improved models are incorporated into stock assessment procedures. While a strict interpretation of the 80 percent scoring guidepost ("assessment methods vary from year to year") would lead to a lower score, it would be unfortunate to downgrade the management system for its attempts to improve assessment methods.

Indicator 1.1.1.3 - uncertainty

The wording here is not very clear and may be misleading. The important point about uncertainty is that it is included in the parameters of the projection model in appropriate places and in appropriate amounts. This should then affect the output in terms of probabilities of achieving management targets. If uncertainty in inputs is high, it become harder to predict outcomes and the probability of achieving a target (or avoiding going below a threshold) at a given level of harvest falls. The result is that the harvest level must be reduced to maintain the desired probability of success. Whether "major" reductions in harvest level are needed depends upon the nature of the uncertainty and the sensitivity of the model to it.

Noting the comment below about rare events, this highlights why they should also be looked at more closely. One of the important issues here is regular reality checks (assessments) to make sure nothing unexpected, or unexplained has happened to drive the harvest strategy off track. The projection may look at the effects of a harvest strategy over several years, but that does not mean you can then go out and harvest as planned without checking back regularly to see how the system is responding in practice.

This also affects the other scoring criteria. There is quite a bit of language in the scoring guideposts requiring that this or that parameter is well known or accurate, and if this is not the case, then the score drops. The more important issue, however, is how the assessment and the projection respond to uncertainties in the parameters that are not well known. It is quite possible to manage sustainably a fishery on a stock about which little is known providing it is done in a precautionary way pending the collection of necessary information.

A-3

Indicator 1.1.2.3.1 Assessment models

It should be reasonable to expect that even at the 80 percent level of scoring, the assessment should include all sources of mortality (not just fishing mortality), but one might expect that non- fishing mortality would be lumped together into a single estimate of natural mortality. At the 100 percent level one might be looking for some examination of inter-annual and age specific components of M, and what sources of M (e.g. predation) might be most important.

Indicator 1.1.2.3.4 Adequate knowledge about the target stocks

This sub-criterion does not include indicators covering the knowledge of the geographical range of the target species (e.g. Burry Inlet cockles certification indicators 1A.1 and 1A.3). Nor does it seem to cover knowledge of stocks outside the management area of the fishery, which may be linked to those inside the management area. Stock structure, the extent and nature of exchanges between stocks inside and outside the management area, and the influence of fisheries outside the management area (e.g. in the western Bering Sea) are clearly important topics for the certification of pollock fisheries in the U.S. EEZ. This last point is apparently covered under Indicator 1.1.2.3.5.1 but the importance of this will depend on knowledge of the exchanges between stocks. Regarding scoring criteria for indicators dealing with stock identity (1.1.2.3.4.2 and 1.1.2.3.4.3), what will be important is not so much whether information on stock separation is unequivocal (which it rarely is and certainly isn't in the case of the pollock), but whether the separation of the fishery into management units is precautionary in the face of uncertainty. For example, is it possible that more than one stock has been lumped together into one management unit (not good)?

Indicator 1.1.2.3.4.5 fishery independent surveys

Regarding the 80 percent scoring criteria under this indicator, it may not be necessary for the surveys to cover "all significant components of the population" to provide "adequate information to measure trends in the abundance of stocks". Pre-recruit and/or adult stock surveys may be adequate by themselves, depending on how the information is used. It is very rare to find surveys of abundance covering "all significant components of the population".

Sub-criterion 1.1.2.3.5, Indicator 1.1.2.3.5.1

There are several issues to be covered here regarding the component of the fishing fleet that is being certified (the current action is for the At-sea Processors' Association) and the extent to which the effects of this component of the fleet are separable from the effects of other components. Are the components of the fleet operating on the target stock that are not subject to certification as well documented as those that are? What differences in selectivity might there be, for example between inshore and offshore components, and between different gears? Also, should the certification be considering the activities of the fleet subject to certification on stocks and species that are not subject to certification? If profits from the pollock fishery allow these vessels to operate elsewhere at other times of the year, should those activities come under some level of scrutiny?

Regarding the observer program, there are major issues of "statistical coverage" to be considered. Large vessels have 100 percent coverage (at least one observer per vessel covering all sea days, but not necessarily observing all hauls). Vessels less than 124ft and greater than 60ft have 30 percent coverage (by vessel days), but vessel/time allocation is not random. Vessels <60ft have no coverage. The allocation of observers and the level of coverage has historic antecedents in statutory provisions related to observation of marine mammal takes. It would be reasonable to re-examine whether the same observer coverage strategies are relevant for statistically valid observations of catch, whether observers have tasks that cover a span of information collection from fisheries to protected species, and whether either objective is adequately served by the amount of coverage.

Indicator 1.1.1.4

The underlying assumption for the scoring guideposts is that outcomes can and should be defined in terms of probability distributions. This may not always be appropriate. For example, in many complex systems, the potentially catastrophic failures are rare enough that they cannot be defined probabilistically. I recommend the certification team review the organizational literature on industrial accidents and the behavior of high-reliability organizations for alternative models.

Criterion 2. Recovery of depleted populations

(See comments under Criterion 1, sub-criteria 1.1.1 and 1.1.2)

How does the scoring under this criterion link with scoring under sub-criterion 1.1.2? Even if the fishery passes under indicators 1.1.2.1 and 1.1.2.2, there still needs to be a “well defined and effective” strategy for promoting recovery of stocks that become depleted.

Criterion 3. Reproductive capacity

More indicators are needed here to be more explicit. For example the NZ hoki certification has three sub-criteria and ten indicators (see below). Some of these are repetitive, but there are several issues that will not be covered adequately by the three indicators currently listed for pollock.

1. There is adequate knowledge about the age, genetic structure, sex composition and reproductive capacity of the target stock being fished

- There is adequate knowledge of the age, genetic structure, sex composition and reproductive capacity of the stock (NZ hoki 1F.1)
- There is adequate knowledge about the reproductive capacity (fecundity, spawning aggregations, age structure) of the target species (NZ hoki 1F.2)
- There is adequate spatial and temporal information on trends in abundance of the spawning stock (NZ hoki 1F.3)

A-5

2. There is adequate knowledge about the fishery to evaluate the impact of fishing on the reproductive capacity of the target species

- There is adequate spatial and temporal monitoring of catch, effort, age and sex composition (NZ hoki 1G.1)
- There is adequate spatial and temporal information on fishing patterns (NZ hoki 1G.2)
- There is adequate spatial and temporal information on fishing methods (gear selectivity, changes in catchability) (NZ hoki 1G.3)

3. There is a well-defined and effective strategy to manage the target stocks to ensure the effects of the fishery on the genetic structure, age and sex composition of the fish population do not impair reproductive capacity

- Age, sex and genetic structure are involved in the stock assessment (NZ hoki 1H.1)
- Reproductive capacity and spawning stock are involved in the stock assessment (NZ hoki 1H.2)
- Management tools (input and/or output controls) are specified and appropriate (NZ hoki 1H.3)
- The current status of the reproductive capacity of the population is known (NZ hoki 1H.4)

Principle 2.

Criterion 1.

The lists under the scoring guideposts are far longer here than those under Principle 1. This may be a reflection of the greater complexity of assessing the effects of fishing on the ecosystem, so the detail has migrated down to a lower level, but it might provide a more robust scoring structure if the indicators (1.2.1 to 1.2.4) were subdivided further. For example, how would you score a fishery that does well on 5 out of the 6 100 percent guidepost elements under indicator 1.2.1, compared to one that does well on only 3 out of the 6? By contrast, most of the guideposts under Principle 1 have only one element.

Indicator 1.2.1

Is the concern about impacts on benthic habitats and corals relevant for this fishery, since it is a midwater trawl fishery? Are you trying to pick up the small portion of the fishery using pots?

Third guidepost under 100 percent, should be “affect” not “effect”

Indicator 1.2.2

The scoring guidelines ignore food chain impacts. Not all impacts on vertebrate and invertebrate communities will occur through bycatch, discard, and direct impacts on habitat. What about the fact that removal of pollock may increase abundance of pollock prey, thereby increasing/decreasing relative population sizes of the prey’s planktonic food species?

A-6

Indicators 1.2.2 – 1.2.4

It is not clear what the difference is among these three indicators. They all focus on impacts on invertebrate or vertebrate communities or biodiversity, and the wording from one to the next is not different enough to seem significant.

Subcriterion 1.3

This seems at odds with subcriterion 1.2. If knowledge is adequate, this reduces the need for research; conversely, if knowledge is inadequate, this would tend to increase the need for research. It therefore seems unlikely that a well-managed fishery would be able to simultaneously achieve the highest score on both sets of indicators. If ultimately the total score received will be compared against the theoretical maximum possible on all indicators, then there's a glitch here.

Indicator 1.3.1

Simply measuring abundances, productivity, etc. over many years and calculating their variability (100 percent scoring guidepost) should not be the requirement for receiving a 100 percent score on this indicator. It's not the measurements that are important but the synthesis of those into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and/or explaining them well enough when they occur that an intelligent choice can be made among alternative management actions. As written, a routine monitoring program that collected data for years and never analyzed or synthesized it could receive a maximum score on this indicator.

Indicator 1.3.2

The scoring guidelines for this indicator may reflect an underlying assumption that habitats are sites that are fixed in space. While that is true in many instances, it is also true that key habitats for organisms in the Bering Sea and Gulf of Alaska ecosystems are defined by specific oceanographic features that move around somewhat in space. Simply tying a monitoring program to a "large number of sites across the geographic range of the fishery" may or may not capture such features. I recommend that more thought be given to incorporating the dynamic nature of this ecosystem in the scoring guidelines.

Criterion 2.

Criterion 2 mentions biological diversity at the genetic, species and population levels, but there is no mention of this in the indicators and scoring guideposts. Biodiversity is mentioned in the sub- criteria and indicators under Criterion 1, although it is not mentioned explicitly in the Criterion – it is in the Certifier's interpretation however. It is unclear how this should be handled, but in any event, the following sub-criteria and indicators might be helpful:

Sub-criteria

The fishery is conducted in a manner which does not have unacceptable impacts on biological diversity at the genetic, species or population levels

An ecological risk assessment has been conducted to determine the potential impacts of the fishery on the genetic, species and population level biodiversity

Indicators:

- There is information available on biological diversity at the genetic, species or population levels
- The effects of the fishery on biological diversity at the genetic, species or population levels have been adequately determined
- Information is available on the extent and significance of such effects

Regarding Subcriteria 2.2 and 2.3 and Indicators 2.2.1 through 2.3.3 thereunder, activities such as assessments, permitting, monitoring, and research related to endangered, threatened, protected or icon species occur in or are conducted by management authorities outside the fishery management regime. It would be useful to have a performance indicator that examines the management system's ability to integrate information and authorities outside the fishery realm. Although Subcriteria 2 and 3 under Principle 3 deal with many of these coordination and integration issues, there is no mention there of protected species. The following might be helpful additions to Subcriteria 2.2 and 2.3:

Indicators:

- The management system includes provisions for acquiring, integrating and synthesizing new scientific information from protected species research, management and recovery programs outside fishery management
- The management system recognizes applicable legislative and institutional responsibilities outside fishery management
- The management system has established mechanisms to conduct integrated and synthetic environmental assessment

Criterion 3.

I agree with the interpretation of "exploited populations" indicated by the certifiers. In fact, the language under this Criterion is more or less identical to that under Criterion 2 of Principle 1. This may be a mistake in the original drafting of the Ps and Cs, since under Principle 2 the focus is clearly on the ecosystem, including non-target species affected by the fishery. There needs to be some specific provision which covers strategies for the recovery and rebuilding of non-target species affected by the fishery, including endangered, threatened or protected species. I recognise that we are not at liberty to change the wording of the criteria, however, to illustrate the point, I suggest that the term "exploited populations" in the criterion should be replaced by "populations affected by the fishery", and the words "and considering the ability of the population to produce long-term potential yields" should be deleted. This criterion would therefore become

"Where populations affected by the fishery are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach".

As stated in the comments under Criterion 1, the protection of dependent and related species (e.g. major predators) should, to the extent possible, be integrated into the decision rules used to determine catch limits and other restrictions on the fishery.

Principle 3

Indicator 1.2

The idea that a fishery management plan **must** include significant and representative areas set aside as no-take zones to achieve the 100 percent scoring guidepost is unrealistic. It is important to specify here what these are intended to accomplish. No take zones are more or less effective depending on the life histories of the species involved, their habitats, the nature of the fishery management regime, and the current status of the stock. Simply requiring that every management plan include no take zones begs these and other significant issues. The indicator itself refers to "Application of zone-based management, where appropriate" – i.e. not in every case. The guidepost at the 80 percent level "No-take zones are used where appropriate" is much better and should be used at the 100 percent level. See the language under indicator 4.1.8 for more effective wording.

Indicator 1.3

Re the scoring guideline that "all environmental and social externalities of fishery are identified, documented and internalized by the fishery," the "all" part of this seems unrealistic and unachievable. I would wager that there is no industry, or industry segment, anywhere in the world that internalizes "all" externalities. Achieving such a goal in this fishery would require substantial changes to nationally accepted accounting practices, state and federal laws, and assumptions about the role of government in society. This seems beyond the scope of the fishery management system.

Re the scoring guideline that "economic rent is shared … by all communities historically dependent…," the definition of the word "historically" is important. The certification team should be aware that the pollock fishery is a relatively new one, without the lengthy history of participation typical of fisheries in other, more accessible regions.

Re the scoring guideline that "fishery management system provides for long-term predictability needed for investment," long-term predictability is not needed for investment. Investment decisions, many of them very large, are made all the time by other industries in the face of large uncertainties. What is important is that, if long-term predictability is not available or possible, that parties have access to the tools needed to hedge uncertainty and manage risk. I recommend expanding the scoring guidelines to include the concept of risk management and hedging, and the ability and willingness of the management system to accommodate such concepts. Given the nature of this ecosystem, long-term predictability may never be possible and it may be a waste of time to keep trying to achieve it.

Overall, the 100 percent scoring guidelines under this indicator seem overly unrealistic. For example:

"All aspects of fishery free from subsidies that promote overfishing or ecosystem degradation". From experience in other areas, we expect that this will be impossible to show.

"All participants in fishery have access to short- and long-term economic incentives to prevent overfishing and ecosystem degradation". There are plenty of ways of avoiding overfishing and ecosystem degradation without the need to provide access to economic incentives (limited entry for example).

"New entrants into the fishery can be accommodated without unduly disrupting other participants or undermining fishery and ecosystem management goals." I don't understand why this is required. No fishery can continue to accommodate new entrants *ad infinitum*. Many fisheries are over-subscribed in terms of the demand for access and entry is limited through a licensing system. Why would such a fishery be scored lower than one that is sufficiently under- subscribed that it can accept new entrants?

What might make more sense is for the social and economic indicators to mirror the stock and ecological ones. For example, rather than set arbitrary—and probably unachievable— performance measures for aspects such as incentives, investment and so forth, why not require the system to set long-term social and economic objectives just as it would for the target stock and the ecosystem? For example, does the system have a mechanism for the kind of long-range planning where stakeholders can describe their "vision" for the future of what they want the fishery to look like? Are there collaborative and rational ways to define objectives for the fleet composition geographically, by community, by size, gear and so forth? Is there a mechanism for stakeholders to determine how to accommodate new entrants? Or are these issues resolved de facto in the hurly-burly of allocation disputes? Most of the hard and fast requirements defined under the 100 percent scoring guidepost could be described in the plan's objectives, if it were required to define some related to people, communities, and social and economic issues.

Sub-criterion 2

Under this criterion it would seem to be important to take up the issue raised under the MSC criterion "The management system shall incorporate an appropriate mechanism for the resolution of disputes arising within the system". Here there is a footnote that states: *"Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification."* A suitable indicator would be:

- There are no outstanding disputes of substantial magnitude involving a significant number of interests

Indicator 2.1 provides an example of the problem stemming from the duplicative numbering scheme. Is the reference to MSC Criterion 3.1 to Criterion 3.1 under Principle 1 or under Principle 2? Also, all the references under the indicators in Principle 3 to other Criteria (e.g., 3.10) actually appear to be references to other indicators. Whatever the case, avoid confusion by being clear which Principle is being referred to.

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Indicator 2.2

The requirement in the 100 percent scoring guidepost that "the management system, including its component institutional entities, has not been found at any time to be in violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty" sets the bar quite high. This is especially true if one considers the courts to be part of the dispute resolution system (see comment on Indicator 3.4 below). Active stakeholder participation often results in litigious advocacy as a means to improve the performance of a system. Nevertheless, as an indicator of ideal performance, we concur in this choice.

Indicator 3.4

It will be important for the evaluation team to decide if they consider the courts to be part of the management system or not. If they are, then lawsuits are just a part of the dispute resolution procedures provided for in law and regulation. If they are not, then lawsuits represent a breakdown in the management system.

Annex: Extract from MRAG paper on SPR
Levels of risk: targets, limits and thresholds

There are two risks involved in implementing National Standard 1. Firstly, there is the biological risk that the stock will become overfished, with the subsequent negative consequences for the fishery. As the level of catch (yield) gets closer to the estimate of maximum sustainable yield, uncertainty and variability dictate that the risk that the stock will become overfished increases (i.e. the catch will overshoot the maximum sustainable yield on a regular basis). Secondly, there is the risk that catches will be too low to achieve social and economic objectives and the potential of the fishery will not be realized (Mace 1994).

Part of the role of fishery managers is to determine or define acceptable levels of risk, and hence what values should be used for reference points to meet the objective of OY, incorporating biological, economic and social considerations in their assessment. As we have seen, text in the 1996 Magnuson-Stevens Act requires that OY cannot be higher than MSY. Management using reference points based on OY should therefore reduce the risk of overfishing compared to simply using MSY. In this context it is important to clarify the terminology used in defining reference points, including *targets*, *thresholds* and *limits* (see Fig. 2).

A *target* reference point usually indicates a desirable state of a fishery, which should be the goal of management action, whether during fishery development, operation of the fishery at near- optimal conditions, or rebuilding from an overfished state. The term *threshold* has been used in the US to indicate a state of the fishery that is undesirable, which management action should avoid (e.g. Rosenberg *et al.* 1994, Restrepo *et al.* 1998). This corresponds to the use of the term *limit* reference point in much of the rest of the fisheries management community around the world (e.g. Garcia 1995). The Food and Agriculture Organization of the United Nations (FAO), and much of the international literature, uses the term threshold to define an "early warning" reference point. Reaching a threshold indicates that a certain type of action (usually agreed beforehand) needs to be taken to reduce the probability that a target or limit point would be exceeded, due to uncertainty in estimates of stock status, or slow management reaction.[33]

[33] This is analogous to the "interim thresholds" referred to in the preamble of the final rule issuing the NSGs.

To avoid confusion in this paper, we will use only two terms for reference points; target and limit. The use of these terms corresponds to that adopted by the international community. For those familiar with terminology used routinely in the U.S., our use of the term limit can be assumed to mean the same as threshold as it is used in the NSGs and some other fisheries literature in the U.S.

By definition in the Magnuson-Stevens Act, the target reference point is represented by OY. This is based on biological, economic, social and other relevant factors, and is always less than or equal to MSY. Due to uncertainty and variability, the target may be exceeded sometimes. Target reference points should be specified so that this is not a problem, providing the level is not exceeded more than 50% of the time, nor on average.

A limit reference point defines the level at which a fish stock becomes overfished. It is therefore defined on the basis of biological considerations only and should be expressed in quantities related to the MSY management objective, for example, as a particular level of adult biomass (a minimum) or fishing mortality (a maximum). The NSGs indicate that in all cases, criteria for determining the status of fished populations must specify both a maximum fishing mortality limit (threshold), or reasonable proxy, and a minimum stock size (biomass) limit (threshold), or reasonable proxy. In terms of our two goals listed in Section 2.3.2, the first is an indicator of overfishing and the second is an indicator of the overfished condition.

In some fishery management plans, the limit (threshold) and target reference points are specified at the same level. Specifying any type of reference point is a step in the right direction, but due to uncertainty in our understanding of the dynamics of most fisheries, it is dangerous to specify the target and the limit as the same. The probability of exceeding the limit year after year, and consequently overfishing the stock is too high. In essence, the limit should *not* be set up as the target, because the chances of missing the target are too great. Put another way, one cannot achieve a goal (the target) while at the same time trying to avoid it (the limit). The specification and use of a target reference point should ensure there is a buffer zone into which the status of the fishery may dip from time to time without crossing the limit and becoming overfished.[34]

Having said that, in considering a fish stock which is recovering from an already depleted state, Powers (1999) emphasized that the highest priority is to determine the limit (threshold) measure, rather than planning the transition of the stock to produce optimum yield (i.e. the target). He considered that, particularly if the recovery trajectory is lengthy, the debate associated with defining the target criteria is not as important as the initiation of recovery itself. As recovery approaches the limit (threshold) level, then questions concerning optimum yield (the target) and how quickly it should be achieved rise in priority (see also Section 6.3).

[34] This, and the specification of control rules associated with threshold and target reference points, is one of the corner stones of the precautionary approach to fisheries management, which advocates the implementation of conservation measures even in the absence of scientific certainty that fish stocks are being overexploited.

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Appendix B: Elements of the U.N. Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks

Management Goal: The management goal of the U.N. Straddling Stocks Agreement, expressed in Article 2, is "to ensure the long-term conservation and sustainable use" of straddling fish stocks and highly migratory fish stocks.

Precautionary Approach: Article 6 and Annex II describe the precautionary approach. The core of the precautionary approach is to act cautiously but expeditiously when information is "uncertain, unreliable, or inadequate," in the words of the U.N. Agreement. The Agreement describes a process for applying this approach that includes the following general features: A) Identifying precautionary reference points for each stock of fish;

B) Identifying in advance management measures that will be adopted if reference points are exceeded;

C) Adopting "cautious" management measures for developing fisheries, until information allows setting reference points;

D) Monitoring the impact of fishing on non-target species and developing plans to conserve them; and

E) Adopting emergency measures if continued fishing would increase the risk of depletion caused by a natural event.

Compatibility of Measures: Article 7 requires compatibility between conservation measures on the high seas and those in the exclusive economic zones of coastal States. Among other considerations in determining compatibility, States are to take into account the biological unity of stocks and the distribution of the stocks, the fisheries, and the geography of the region. If compatible measures are not achieved, States are to use the procedures for dispute resolution identified in the U.N. Agreement.

Elements of Regional Agreements: According to Article 9, regional arrangements are to identify the stocks under management, the area of application, and the way in which a regional regime will obtain scientific advice.

Functions of Regional Regimes: Article 10 identifies 13 specific functions, which may be summarized as follows:

A) Developing conservation measures in a timely manner;

B) Obtaining scientific advice;

C) Collecting, analyzing, and disseminating fisheries data; D)

Monitoring and enforcing conservation measures;

E) Insuring full cooperation of national agencies in implementation; F)

Identifying how new members will be accommodated; and

G) Promoting peaceful settlement of disputes.

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Transparency: Article 12 calls for transparency in decision making by regional regimes and for the participation of intergovernmental and nongovernmental organizations, subject to procedural rules that are not "unduly restrictive."

Membership: Article 17 calls upon State members of regional regimes to request that non-participating States join the regime and to take action to deter activities that undermine the effectiveness of regional conservation regimes.

Flag State Responsibilities: Article 18 enumerates eight obligations of flag States, including maintaining an accessible registry of vessels authorized to fish on the high seas, requirements for vessel and gear marking and for timely reporting of catch and other information, national inspection and observer schemes, and measures to insure transhipment at sea does not undermine conservation measures.

Enforcement: Article 19 enumerates five obligations of flag States in enforcing regional conservation measures. Articles 20-23 describe procedures by which Flag States and other States should collaborate in enforcing regional conservation measures, and provides authority for States to board fishing vessels of other States. Article 21 identifies eight specific activities that qualify as serious violations, including failing to maintain accurate records of catch, fishing in closed areas or seasons, or using prohibited fishing gear. Regional regimes may identify other serious violations.

Developing States: Articles 24-26 of the U.N. Agreement call for providing financial and technical assistance to developing States for management under the Agreement. Conservation measures are not to place an undue burden on developing States.

Dispute Resolution: Articles 27-32 call for States to settle disputes through peaceful means of their choice, and describe procedures for settling disputes.

Information Collection and Analysis: Article 14 describes five principal obligations of States for collecting and providing information and cooperating in scientific research. Annex I provides specific types of data that should be collected on fisheries and vessels, and describes obligations for frequent reporting by vessels, verification of data, and data exchange.

Other Obligations: Article 5 briefly describes 12 general tasks, some of which are described in greater detail elsewhere in the UN Agreement. Tasks that do not receive significant additional treatment in the U.N. Agreement include:

A) Assess the impacts of fishing and other factors on target, associated, or dependent stocks; B)

Adopt measures to maintain or restore associated or dependent species above levels "at which their reproduction may become seriously threatened;"

C) Minimize pollution, waste, discards, catch by lost or discarded gear, and bycatch; D)

Protect biodiversity;

E) Adopt measures to prevent or eliminate overfishing and overcapitalization; and

F) Consider the interests of artisanal and subsistence fishermen.

Source: Weber 1998.

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Appendix C: History of the Bering Sea/Aleutian Islands Fishery Management Plan

Year	Amendment	Regulatory Action(s)
2001	69	Allows vessels to lease their pollock quota to AFA qualified vessels outside their co-ops.
2001	68	Pot cod split CV/CP analysis; split the 18.3% of pot gear Pacific cod TAC among pot catcher/processors and pot catcher vessels according to historical catch.
2001	67	Stabilizes the fully utilized fixed gear Pacific cod fishery in the BSAI using endorsements for exclusive access to long-time participants.
2000	66	Removes the squid allocation to the Western Alaska CDQ program. Prevents incidental catch of squid in pollock fisheries.
2000	65	Prohibits a commercial fishery for HAPC biota (corals, sponges, kelp, rockweed, and mussels).
2000	64	Apportions hook-and-line or pot gear (fixed gear) allocation of TAC of Pacific cod in BSAI among hook-and-line catcher-processor vessels and hook-and-line catcher vessels and pot-gear vessels.
1999/2001	63	Revises management of sharks, skates, squid, octopi, and sculpins into "other species."
	62	See 61.
2000	61	Incorporates the provisions of the AFA into the FMPs and their implementing regulations (formerly Plan Amendment 62).
2001	60	Makes changes to the License Limitation Program.
1998	59	Extends the Vessel Moratorium Program for qualified vessels.
1999	58	Establishes a framework to allow NMFS to reduce the annual trawl bycatch limit for Chinook salmon and revises the Chinook Salmon Savings Area in the BSAI to reduce bycatch of Chinook salmon by trawl fisheries in the BSAI.
1999	57	(1) Prohibits the use of nonpelagic trawl gear in the directed pollock fisheries of the BSAI; (2) revises the existing performance standard for pelagic trawl gear; and (3) reduces crab and halibut bycatch limits established for the BSAI groundfish trawl fisheries to address bycatch reduction objectives.
1999	56	Defines ABC and OFL for the BSAI groundfish fisheries.
1999	55	Delineates EFH ("…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity") for all managed species.
2001	54	Makes three changes to the Individual Fishing Quota program for fixed gear Pacific halibut and sablefish fisheries off Alaska: (1) allows a QS holder's indirect ownership of a vessel; (2) defines "a change in the corporation or partnership" to prevent estates; and (3) standardizes use limits for the two IFQ species.
1998	53	Allocates shortraker rockfish and rougheye rockfish (SR/RE) in the Aleutian Islands subarea between vessels using trawl gear and vessels using non-trawl gear to prevent the incidental catch of SR/RE in trawl fisheries from closing non-trawl fisheries.

Year	Amendment	Regulatory Action(s)
	52	Implements advance registration requirements for vessels participating in certain fisheries at risk of TAC overages; implementation of sideboard measures under the AFA alleviates the need for this measure
1998	51	Re-establishes the catcher vessel operational area in the Bering Sea and the allocations of TACs of pollock and Pacific cod between inshore and offshore components through 2001. Recommended changing the pollock allocations from 65% offshore and 35% onshore to 61% offshore and 39% onshore for 1999-2001. Partially approved/disapproved.
	50	Authorizes the retention and processing of halibut taken as bycatch up to a limit of 50,000 pounds, for donation to economically disadvantaged individuals (halibut donation program).
1997	49	Requires all vessels fishing for groundfish in the BSAI management area to retain all pollock and Pacific cod beginning January 1, 1998, and all rock sole and yellowfin sole beginning January 1, 2003. Establishes a 15% minimum utilization standard for all at-sea processors; for pollock and Pacific cod beginning January 1, 1998 and for rock sole and yellowfin sole, beginning January 1, 2003.
1998	48	Streamlines the Council's annual groundfish harvest specification process. Identifies legal and technical problems. Concept of this amendment was tabled in mid-1999.
1996	47	Repeals regulations implementing the North Pacific Fisheries Research Plan. Establishes an Interim Groundfish Observer Program until a long-term program that addresses concerns about observer data integrity, equitable distribution of observer coverage costs, and observer compensation and working conditions is recommended by the Council and implemented by NMFS.
1996	46	Authorizes the continued allocation of Pacific cod TAC among vessels using different gear types and the further allocation of the portion of the Pacific cod TAC to vessels using trawl gear between catcher vessels and catcher-processor vessels.
1998	45	Reauthorizes the allocation of 7.5% of the pollock TAC to the Western Alaska CDQ program.
1996	44	Adopts new definitions for ABC and overfishing levels.
1996	43	Increases the consolidation ("sweep-up") levels for small quota share blocks for Pacific halibut and sablefish managed under the IFQ program.
1996	42	Allows quota shares and IFQ assigned to vessels in larger size categories to be used on smaller vessels. Provides small boat fishermen with more opportunities to improve the profitability of their operations.
1996	41	Authorizes the annual specification of *C. bairdi* PSC limits in Zones 1 and 2 based on abundance of crab estimated from data collected during the annual NMFS trawl survey.
1997	40	Establishes a PSC limit for *C. opilio* crab in a new Bycatch Limitation Zone of the Bering Sea. Upon attainment of a *C. opilio*

Year	Amendment	Regulatory Action(s)
		bycatch allowance apportioned to a particular trawl fishery category, the *C. opilio* Bycatch Limitation Zone would be closed to directed fishing for species in that trawl fishery category.
1997	39	Establishes a 7.5% CDQ reserve for each groundfish species TAC and PSC limit, and a license limitation program.
1995	38	Amends #18 with two changes: (1) decreases size of the catcher vessel operational area by moving the western boundary of the area 30 minutes to the east; and (2) allows catcher processors to engage in directed fishing for pollock inside the catcher vessel operational area if the inshore component pollock allocation was closed to directed fishing and the offshore component allocation was still open to directed fishing.
1996	37	Authorizes the annual specification of the red king crab bycatch limit based on the abundance of Bristol Bay red king crab.
1997	36	Defines a forage fish species category and implements associated management measures.
1995	35	Requires a second NMFS-certified observer at shoreside processing facilities that (1) offload fish at more than one location on the same dock; (2) have distinct and separate equipment at each location to process those fish; and (3) that receive Bering Sea pollock harvested by catcher vessels in the catcher vessel operational area, during the second pollock season.
1997	34	Requires that up to 2% of the TAC for Atka mackerel in the eastern Aleutian Islands district and the Bering Sea subarea be allocated to the jig gear fleet.
1995	32	Achieves full utilization by relieving transfer restrictions on CDQ compensation quota shares, thereby allowing transfers to persons who could use the resulting IFQ to harvest the resource.
1994	24	Allocates on a temporary basis the BSAI Pacific cod TAC among vessels using trawl gear (54%), fixed gear (hook-and-line and pot) (44%) and jig gear (2%). The allocations, which were scheduled to expire at the end of 1996, represented roughly the existing harvest percentages of the two major sectors (trawl and hook-and-line), while specifically allocating 2% to jig gear. The 2% allocation to jig gear exceeded the existing harvest percentage taken by that gear type and was intended to allow for growth in the jig sector.
	23	Adopts vessel replacement restrictions (moratorium).
1991	18	Establishes a CDQ program and sets aside one-half of the pollock reserve (7.5% of the BSAI pollock TAC) for CDQ harvest; allocates 35% of the remaining BSAI pollock TAC to vessels catching pollock for processing by the inshore component and 65% of the remaining BSAI pollock TAC to vessels catching pollock for processing by the offshore component in the first year of the allocation, with the inshore allocation increasing to 40% in the second year and to 45% in the third and fourth years of the amendment, respectively. Also establishes a catcher vessel operational area from which catcher processors and motherships

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Year	Amendment	Regulatory Action(s)
		would be excluded throughout the fishing year when operating in a directed fishery for pollock.
	1	Provides the framework to manage the groundfish resources as a complex.

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Appendix D: Tiered System for Determining Overfishing Levels in the Bering Sea/Aleutian Islands and Gulf of Alaska groundfish fisheries

1) Information available: Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY}.

1a) Stock status: $B/B_{MSY} > 1$

$F_{OFL} = \mu_A$, the arithmetic mean of the pdf

$F_{ABC} \leq \mu_H$, the harmonic mean of the pdf

1b) Stock status: $\alpha < B/B_{MSY} \leq 1$

$F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

$F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

1c) Stock status: $B/B_{MSY} \leq \alpha$

$F_{OFL} = 0$

$F_{ABC} = 0$

2) Information available: Reliable point estimates of B, B_{MSY} , F_{MSY} , $F_{35\%}$, and $F_{40\%}$.

2a) Stock status: $B/B_{MSY} > 1$

$F_{OFL} = F_{MSY}$

$F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$

2b) Stock status: $\alpha < B/B_{MSY} \leq 1$

$F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

$F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha)/(1 - \alpha)$

2c) Stock status: $B/B_{MSY} \leq \alpha$

$F_{OFL} = 0$

$F_{ABC} = 0$

3) Information available: Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.

3a) Stock status: $B/B_{40\%} > 1$

$F_{OFL} = F_{35\%}$

$F_{ABC} \leq F_{40\%}$

3b) Stock status: $\alpha < B/B_{40\%} \leq 1$

$F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$

$F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha)/(1 - \alpha)$

3c) Stock status: $B/B_{40\%} \leq \alpha$

$F_{OFL} = 0$

$F_{ABC} = 0$

4) Information available: Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.

$F_{OFL} = F_{35\%}$

$F_{ABC} \leq F_{40\%}$

5) Information available: Reliable point estimates of B and natural mortality rate M.

$F_{OFL} = M$

$F_{ABC} \leq 0.75 \times M$

6) Information available: Reliable catch history from 1978 through 1995.

OFL = the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information. ABC $\leq 0.75 \times$ OFL.

Sources: NPFMC 2000a; 2000b.

Appendix E: Regulatory Framework

Management of North Pacific pollock in the high seas area of the Bering Sea is governed by the **Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea** (Senate Treaty Doc. 103-27), adopted in 1994. In addition to allocation, observer coverage and other provisions, the Convention includes a prohibition on fishing in the Donut Hole until the biomass of the Aleutian Basin stock is determined to exceed a threshold of 1,670,000 mt. China, Korea, Russia, the United States, Japan and Poland are all party to the agreement.

Management of the North Pacific pollock fishery in the U.S. EEZ is governed by a number of federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems within which those fisheries are conducted. Major laws affecting federal fishery management decision making are summarized below.

The **Magnuson-Stevens Fishery Conservation and Management Act** (M-SFCMA) (16 U.S.C. 1801 et seq.) (originally enacted in 1976 as the Fishery Conservation and Management Act) claims sovereign rights and exclusive fishery management authority over most fishery resources within the U.S. EEZ, an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the U.S. EEZ. Responsibility for federal fishery management decision making is divided between the U.S. Secretary of Commerce and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring they are consistent with ten national standards set forth in the statute, as well as with other provisions of the M-SFCMA, regulations governing international fisheries in which the United States participates, and other applicable laws. This responsibility has been delegated to the National Marine Fisheries Service under the National Oceanic and Atmospheric Administration.

The **American Fisheries Act** (AFA) of 1998, located within the Omnibus Consolidated and Emergency Supplemental Appropriations Bill for Fiscal Year 1999, provides for the allocation of pollock quota among the catcher-processor, mothership, and inshore processing sectors.

The **Coastal Zone Management Act** (CZMA) of 1972 (16 U.S.C. 1451 et seq.) encourages state and federal cooperation in the development of plans that manage the use of natural coastal habitats, as well as the fish and wildlife those habitats support. When proposing an action determined to directly affect coastal resources managed under an approved coastal zone management program, NMFS is required to provide the relevant state agency with a determination that the proposed action is consistent with the enforceable policies of the approved program to the maximum extent practicable at least 90 days before taking final action.

The **National Environmental Policy Act** (NEPA) of 1969 (42 U.S.C. 4321 et seq.) requires federal agencies to consider the environmental and social consequences of proposed major actions, as well as alternatives to those actions, and to provide this information for public consideration and comment before selecting a final course of action. Under NEPA and its implementing regulations, NMFS is required to prepare environmental impact statements for major fishery actions that significantly affect the quality of the human environment and to prepare an environmental assessment for those actions that are determined to not significantly affect the human environment. Social considerations are to be accounted for through the development of social impact assessments.

The **Endangered Species Act** (ESA) of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies use their authorities to conserve endangered and threatened species and that they ensure actions they authorize, fund, or carry out are not likely to harm the continued existence of those species or the habitat designated to be critical to their survival and recovery. The ESA requires NMFS, when proposing a fishery action that "may affect" critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) to determine the potential impacts of the proposed action. Informal consultations are conducted for proposed actions determined to "may affect," but "not likely to adversely affect" critical habitat or endangered or threatened species. Formal consultations, including a biological opinion, are completed for proposed actions determined to "likely to adversely affect" critical habitat or endangered or threatened species. If jeopardy or adverse modification is found, the agency is required to suggest reasonable and prudent alternatives.

The **Marine Mammal Protection Act** (MMPA) (16 U.S.C. 1361 et seq.), originally enacted in 1972, established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States. The Secretary of Commerce is responsible for the conservation and management of all pinnipeds, other than walruses; the Secretary of the Interior for all other marine mammals. This responsibility includes maintaining populations of marine mammals at optimum levels, defined as "…the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element," and developing conservation plans for populations that fall below this threshold level. Marine mammal stock assessments, take reduction plans for stocks reduced or depleted as a consequence of interacting with commercial fisheries, and studies of pinniped-fishery interactions are all components of a new system established by the 1994 amendments to the MMPA to control marine mammal mortality in commercial fisheries. Under this new system, all U.S. commercial fishing operations are characterized as one of three types based on their levels of incidental and serious injury of marine mammals. At a minimum, vessel owners must register for an Authorization Certificate and may also be required to carry fishery observers.

The **Regulatory Flexibility Act** (RFA) of 1980 (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NMFS must determine whether a proposed fishery regulation will have a significant economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the act requires the agency to prepare an initial and final Regulatory Flexibility Analyses to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the Federal Register in full or in summary for public comment

and submitted to the chief counsel for advocacy of the Small Business Administration.

Changes to the RFA in June 1996 enable small entities to seek court review of an agency's compliance with the Act's provisions.

Executive Order 12866: Regulatory Planning and Review, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O.
12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the RFA. A regulation is significant if it is likely to result in an annual effect on the economy of at least $100,000,000 or has other major economic effects.

All federal rulemaking is governed under the provisions of the **Administrative Procedure Act**
(APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the APA, NMFS is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect.

The **Paperwork Reduction Act** of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure that the public is not overburdened with information requests, that the federal government's information collection procedures are efficient, and that federal agencies adhere to appropriate rules governing the confidentiality of such information. The PRA requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishery information from the public.

APPENDIX 3 - DOCUMENT PROVIDED BY MARTIN DORN (AFCS, SEATTLE) TO THE SCS EVALUATION TEAM ON 20 MARCH 2003.

Here is the response to the first part of your request. I included figures that compare Gulf ofAlaska pollock and eastern Bering Sea pollock. The following are a few comments that I hope will be useful to the certification team in interpreting the information contained in the figures and tables.

1. In the North Pacific, unfished stock size is usually estimated by multiplying mean recruitment since 1977 by the spawning biomass per recruit in the absence of fishing. The break at 1977 recognizes the shift in the PDO (Pacific decadal oscillation) that occurred in 1977. Some researchers have identified subsequent regime shifts, i.e., in 1989 and 1998 (Hare and Mantua 2000), but there is no general agreement about these regime shifts. The using post-1977 mean recruitment is problematic for GOA pollock because they do not appear to respond to PDO-scale variation (Hollowed et al. 2001). Although the 1970s was a decade of strong recruitment for GOA pollock, four out the seven strong year classes (> 1.0 billion age-2 recruit) in the 1970s occurred prior to 1977. Recruitment success (*log(R/S)*) for pollock in the Gulf of Alaska was average in 1960s, high in 1970s, and low in the 1980s and 1990s (Dorn et al. 2001).

2. The estimate of stock size obtained by "replaying" the population dynamics without fishing is an alternative estimator of unfished stock size. For example, mean virtual unfished spawning biomass since 1977 for GOA pollock is nearly equivalent to B_{zero} obtained by multiplying mean recruitment during that time period by the spawning biomass per recruit without fishing (Table 1).

3. The depletion estimate obtained by taking the ratio of the model estimate of current biomass to virtual unfished biomass implicitly takes into account environmental trends that affect stock productivity. Both the conventional estimate of depletion and this new estimator do not take into account the indirect impacts of fishing due to changes in stock biomass (fewer recruits at low stock size, more cannibalism at high stock size). For example, the decline in mean recruitment in the 1980s and 1990s could be argued to be result of lower spawning biomass, not environmental change. This line of argument is countered by noting that low stock sizes in the 1970s produced strong year classes, and that there isn't a clear pattern of declining recruitment in a plot of recruitment against spawning biomass. Many fisheries debates revolve around the relative importance fishing versus the environment. Perhaps a stronger case can be made for the environment in this instance because harvest rates for GOA pollock have been demonstrably conservative for a gadid (Fig. 3).

4. The estimated time series of abundance for both GOA and EBS pollock are unusual (but similar) in showing low biomass prior to large-scale fishery development (Figs. 1&2). EBS pollock was overexploited in the early 1970s, leading to stock depletion in the late 1970s (stock depletion >80%), followed by restrictive management and a rebuilt stock (Fig. 4). In

contrast, harvest rates for GOA pollock have been relatively low throughout the history of its exploitation. The estimated harvest rate (catch/age 3+biomass) for GOA pollock has been lower than EBS pollock in 20 out of 26 years since 1977.

References

Dorn, M.W., Hollowed, A.B., E. Brown, B. Megrey, C. Wilson, and J. Blackburn. Assessment of the walleye pollock stock in the Gulf of Alaska. *In* Stock Assessment and Fishery Evaluation Report for Groundfish Resources of the Gulf of Alaska. Prepared by the Gulf of Alaska Groundfish Plan Team, North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, AK 99510. North Pacific Fisheries Management Council, Anchorage, AK.

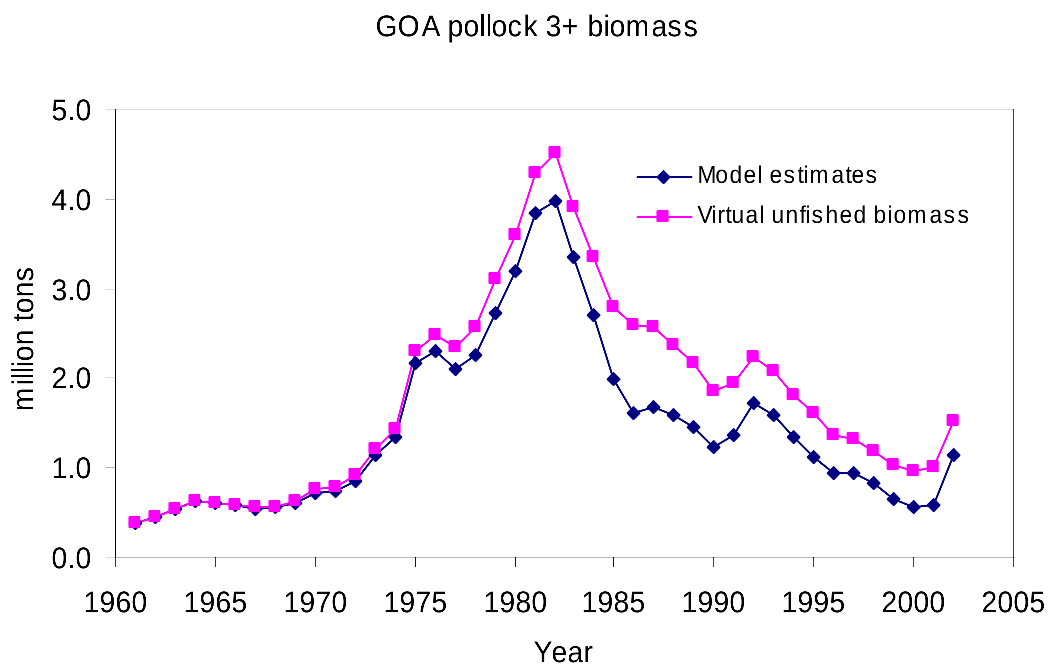
Hare, S. R. and N. J. Mantua. 2000. Empirical evidence for North Pacific regime shifts in 1977 and 1989. Prog. Oceanogr. 47(2-4): 103-146.

Hollowed, A.B., Hare, S.R., Wooster, W.S. 2001. Pacific Basin climate variability and patterns of Northeast Pacific marine fish production. Prog. Oceanogr. 49:257-282.

Table 1. Gulf of Alaska pollock age 3+ (000,000 tons) and female spawning biomass (000,000 tons) from the 2002 stock assessment (model estimates) and virtual biomass obtaining by "replaying" the population dynamics with the same recruitment estimates but without fishing. The ratio is an estimate of stock depletion (model estimate/virtual biomass without fishing).

	3+ biomass			Female spawning biomass			
Year	Model estimates	Zero catch virtual biomass	Ratio	Model estimates	Zero catch virtual biomass	Ratio	Catch (tons)
1961	0.371	0.371	100%	0.079	0.079	100%	
1962	0.448	0.448	100%	0.090	0.090	100%	
1963	0.534	0.534	100%	0.104	0.104	100%	
1964	0.621	0.621	100%	0.123	0.123	100%	1,126
1965	0.599	0.600	100%	0.144	0.144	100%	2,749
1966	0.586	0.591	99%	0.156	0.158	98%	8,932
1967	0.538	0.554	97%	0.155	0.162	96%	6,276
1968	0.547	0.569	96%	0.147	0.156	94%	6,164
1969	0.593	0.619	96%	0.141	0.152	92%	17,553
1970	0.709	0.754	94%	0.138	0.155	89%	9,343
1971	0.740	0.790	94%	0.153	0.172	89%	9,458
1972	0.852	0.904	94%	0.171	0.192	89%	34,081
1973	1.133	1.210	94%	0.188	0.218	86%	36,836
1974	1.339	1.438	93%	0.221	0.260	85%	61,880
1975	2.160	2.304	94%	0.275	0.327	84%	59,512
1976	2.291	2.473	93%	0.381	0.446	85%	86,527
1977	2.091	2.354	89%	0.481	0.570	84%	118,356
1978	2.247	2.577	87%	0.524	0.645	81%	96,935
1979	2.728	3.098	88%	0.531	0.668	80%	105,748
1980	3.183	3.598	88%	0.584	0.732	80%	114,622
1981	3.833	4.294	89%	0.474	0.589	80%	147,744
1982	3.964	4.500	88%	0.542	0.669	81%	168,740
1983	3.344	3.908	86%	0.707	0.876	81%	215,608
1984	2.704	3.357	81%	0.749	0.988	76%	307,401
1985	1.992	2.796	71%	0.642	0.962	67%	284,826
1986	1.602	2.594	62%	0.588	0.999	59%	87,809
1987	1.679	2.563	66%	0.487	0.860	57%	69,751
1988	1.594	2.371	67%	0.392	0.711	55%	65,739
1989	1.447	2.172	67%	0.355	0.611	58%	78,392
1990	1.234	1.862	66%	0.384	0.657	58%	90,744
1991	1.370	1.935	71%	0.347	0.605	57%	100,488
1992	1.723	2.243	77%	0.291	0.500	58%	90,857
1993	1.577	2.070	76%	0.329	0.528	62%	108,908
1994	1.331	1.813	73%	0.385	0.589	65%	107,335
1995	1.123	1.605	70%	0.356	0.555	64%	72,618
1996	0.929	1.362	68%	0.326	0.511	64%	51,263
1997	0.934	1.313	71%	0.282	0.459	61%	90,130
1998	0.836	1.179	71%	0.214	0.382	56%	125,098
1999	0.650	1.021	64%	0.191	0.366	52%	95,590
2000	0.566	0.967	59%	0.173	0.351	49%	73,080
2001	0.589	0.997	59%	0.164	0.359	46%	72,076
2002	1.130	1.517	75%	0.142	0.325	44%	51,936
Bzero (mean recr.)		1.895			0.600		
Average (1979-2002)		2.297			0.619		

Figure 1. Gulf of Alaska age 3+ biomass (top) and female spawning biomass (bottom). Model estimates are from the 2002 assessment (Dorn et al. 2002), while the virtual unfished biomass was obtained by projecting the stock dynamics with the same recruitment time series in the absence of fishing.



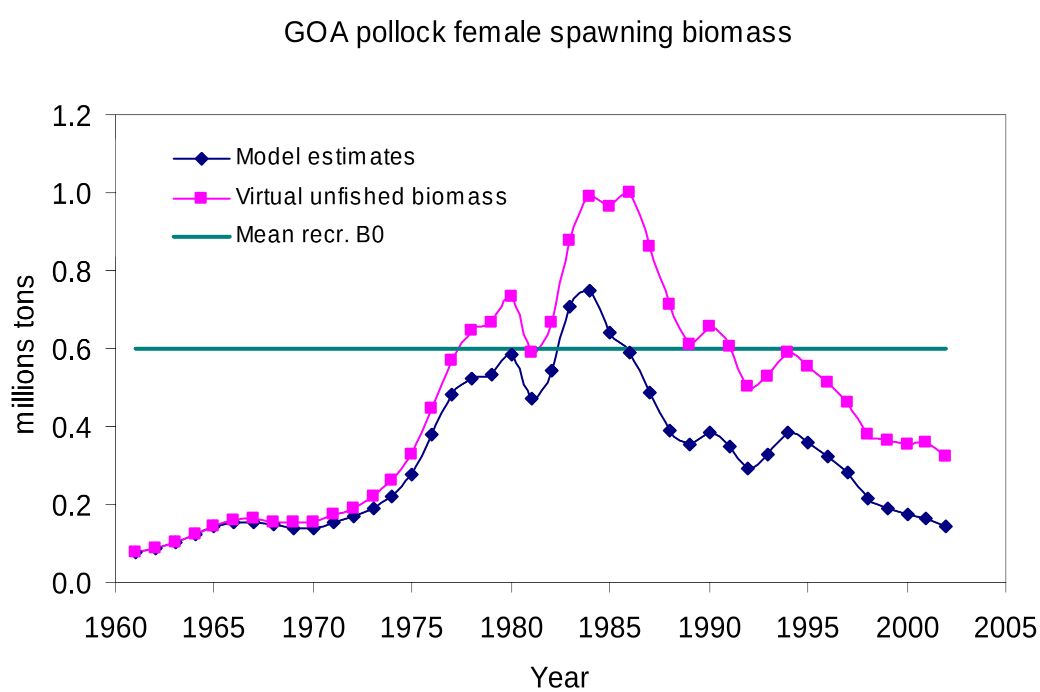
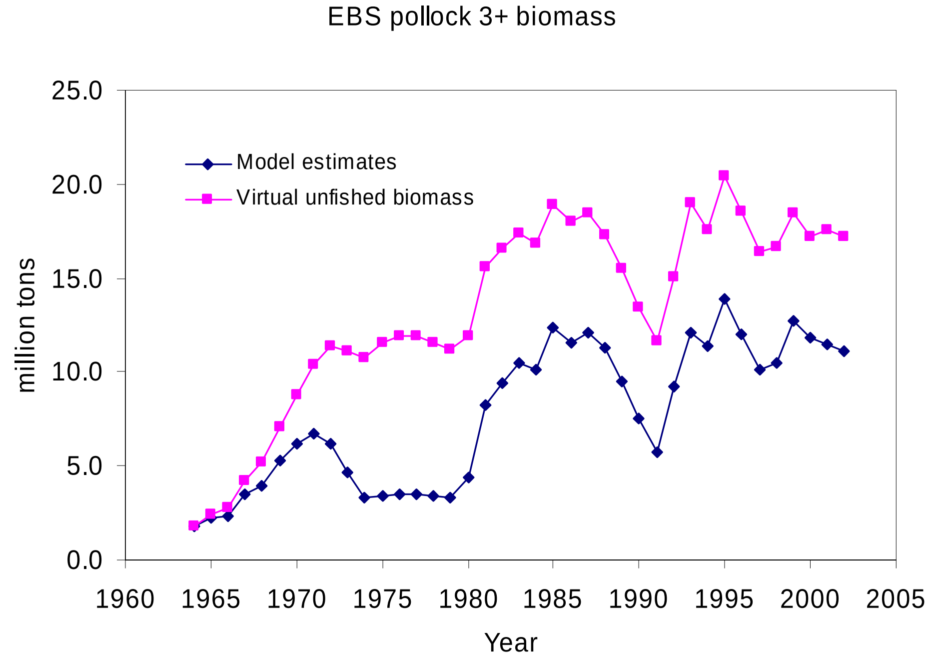


Figure 2. Eastern Bering Sea age 3+ biomass (top) and female spawning biomass (bottom). Model estimates are from the 2002 assessment (Ianelli et al. 2002), while the virtual unfished biomass was obtained by projecting the stock dynamics with the same recruitment time series in the absence of fishing.



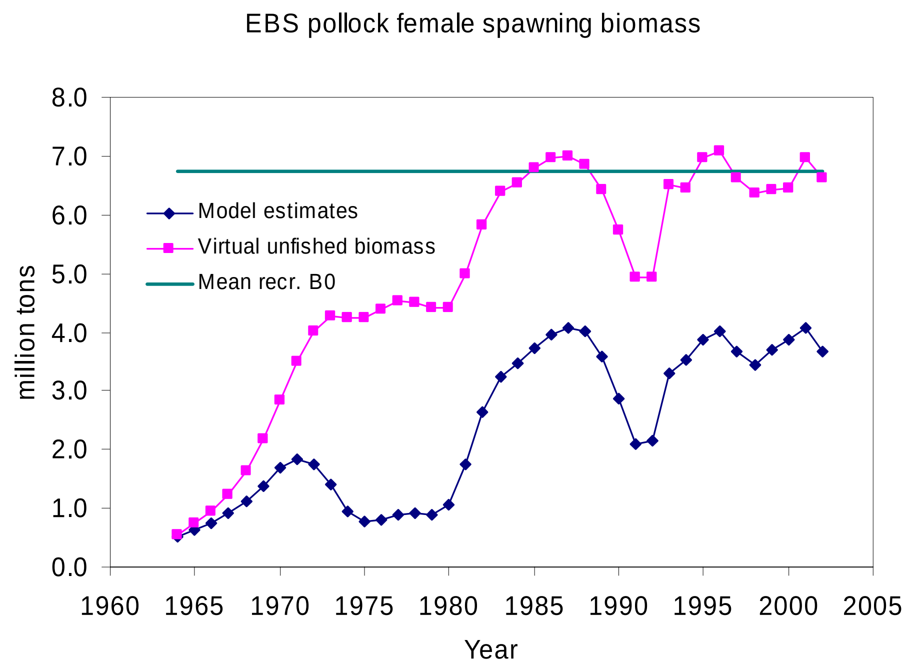


Figure 3. Harvest rate (catch/age 3+ biomass) of eastern Bering Sea and Gulf of Alaska pollock (1964-2002).

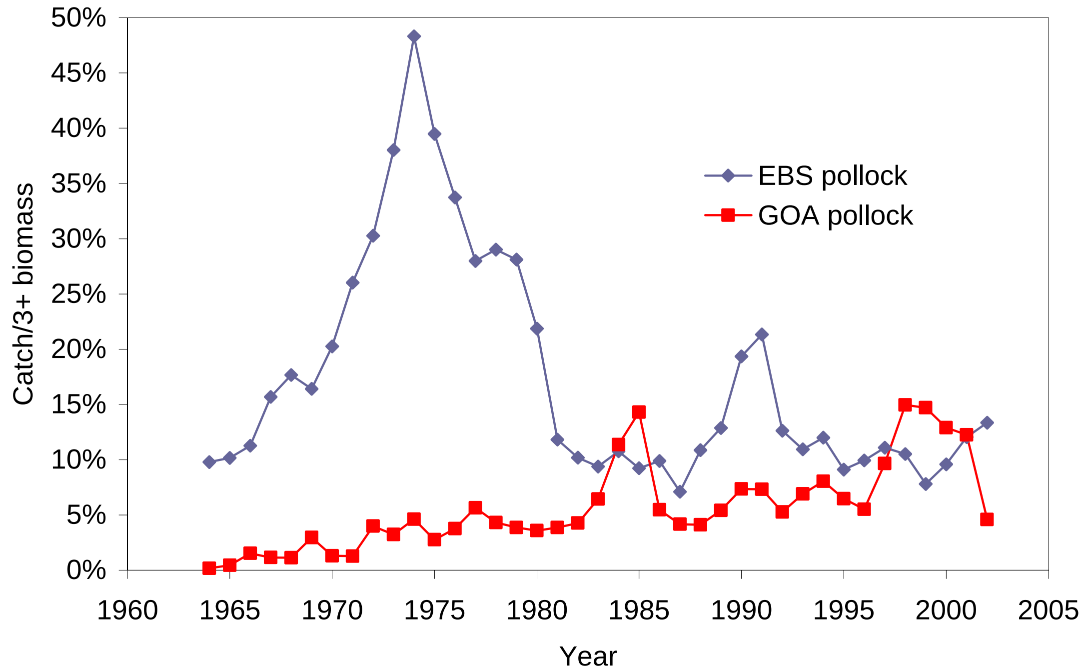
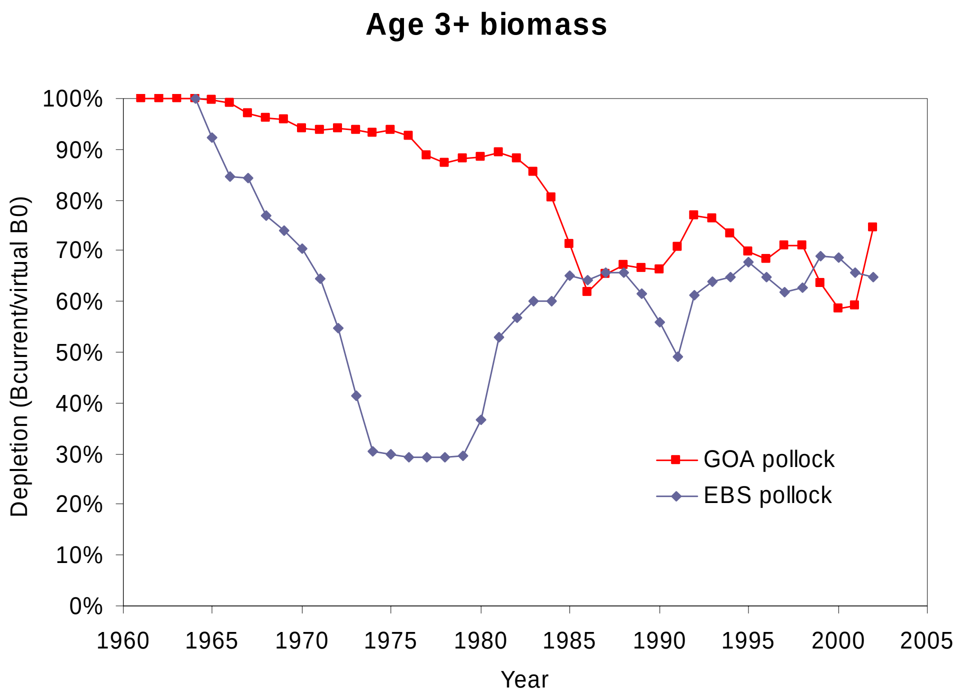
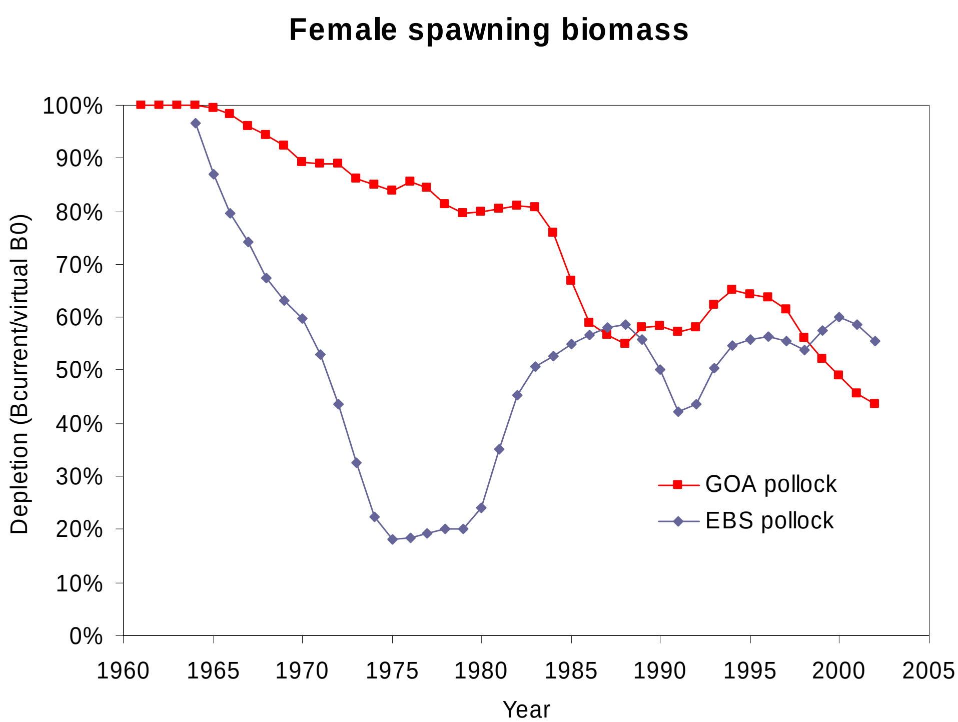


Figure 4. Depletion (Bcurrent/virtual unfished biomass) for eastern Bering Sea and Gulf of Alaska pollock. The top panel shows the depletion of age 3+ biomass, while the bottom panel shows the depletion of female spawning biomass.





APPENDIX 4 – PEER REVIEW REPORT DR. SUSAN HANNA

Hanna comments on MSC Assessment Report on the U.S. Gulf of Alaska Pollock Fishery

General Comments

1. Overall clarity of the report:

The clarity of the report is uneven. Efforts should be made to smooth out the rough spots and to increase consistency between sections. A thorough discussion of the review standards applied to information provided to the team is needed. It would greatly improve the clarity of the report if information were included on the process by which the team evaluated the quality of the information it received. This isn't apparent in the text presenting the rationale for scores.

Some thought should also be given to the extent to which precautionary *actions* are credited in absence of an explicit precautionary *plan* to act. This issue arises in different places in the text, and deserves explicit discussion as a general process aspect of the evaluation.

The report should convey a clearer understanding of the respective roles and responsibilities of various entities within the management process. The report now contains a general description of the major actors and a listing of the various statutes that the management system is charged with implementing, but some of the comments provided under scoring evaluations fail to explicitly acknowledge the legal conditions under which the US fishery management system operates. To some degree the conditions specified by an MSC review introduce a parallel government process and it is confusing to read about requirements placed on the government system to meet the criteria of the MSC process, without acknowledgement of these separate respective roles or the responsibilities and resource limitations ($ and personnel) under which the governmental system is operating. It is likely that this issue has been discussed by the team. Inclusion of the points of that discussion in the report would help clarify respective roles in the MSC process.

Careful consideration should also be given as to whether the focus of specified conditions should be on process or outcomes. There is some inconsistency across conditions in this regard, as well as some internal inconsistency within conditions, where a caution about being overly prescriptive is followed by rather detailed prescription of a process to be followed. The team should discuss this issue and include a description of their conclusions in the front matter describing the evaluation and ranking process. The team may decide that in some cases the focus of the condition is on process, and in others on target outcomes, in which case explicit acknowledgement of a condition's focus should be included in the text describing the condition.

Terms: use “regional councils” instead of “federal councils.” Use a consistent term for pollock – sometimes “walleye pollock” is used and sometimes “pollock” is used.

2. Description of weights:

The description of the weighting process needs elaboration. I found reference to the fact of prioritization and weighting of indicators on P.33 and in Table 4, without explanation as to the process by which relative priorities among indicators were derived. A complete explanation of the criteria and process used by the team to assign weights, along with a summary description of the properties of the AHP using Expert Choice software should be included in Section 7. It would be more useful to embed a summary of the AHP in this section rather than to refer to reader to the MSC website.

3. Adequacy of background information on the fishery, MSC assessment process and evaluation team’s conclusions and recommendations:

The background information is in general adequate, with the exception of the background section on management (MSC Principle 3), which could be presented in a much more straightforward and clean manner.

A great deal of thought obviously went into the development of indicators and criteria for different scoring “guideposts”. Care needs to be taken to relate the scoring and the explanatory text directly to the criteria listed under each guidepost, explaining where the fishery meets the criteria for the score assigned and where it fails to meet the criteria for a higher score. The extent to which this is done is uneven. Sometimes the explanation for a score includes evaluation points not included in the scoring guidepost criteria.

Absent a more complete description of scoring and more explicit reference to the score guidepost criteria, many of the scores seem arbitrary. Explanation should be given as to how the evaluation team considered the relative weights of past versus present practice. In some cases, scores were downgraded on the basis of past practice even while acknowledging that present practice had changed.

The evaluation team’s conclusions and recommendations contain several inconsistencies noted in the review comments. Key issues are the wide variation in the level of detail and level of specificity of text explanations, the degree to which scoring criteria are directly referenced, and the degree to which statements are documented. There also appear to be some inconsistencies across indicators in terms of the conclusions reached.

Specific comments

Comments regarding any technical inaccuracies or inadequacies

note: in areas of duplication of front matter material, the same general comments apply to the GOA and BSAI documents.

In several places throughout the document, the pollock fisheries are referred to as "among the largest fisheries in the United States." In volume terms, Alaska pollock is THE largest fishery in the United States. In 2002 pollock landings were about twice as large as the second largest fishery, menhaden. Pollock accounted for about 36% of total U.S. landings in 2002. In value terms, pollock ranked 4th in the U.S. in 2002, after shrimp, crabs and lobsters. (Fishery Statistics of the U.S. 2002.)

Worldwide, the Alaska pollock fisheries were second to anchoveta in volume landed in 2002 (FAO World Fisheries and Aquaculture 2002).

Format: Comments note for each indicator where rationale for score is clear and where unclear or inconsistent with other text.

Specific comments on front matter

Section needs to be spellchecked to fix several small typos.

P.6, #2: shouldn't it be either threatened or endangered, or do different stocks have different status? Later in the paragraph, shouldn't the term be "stocks" instead of "populations"?

P.6, #3: fix the "among the largest fisheries in the US" (see comment above) here and elsewhere in the document.

P.6, #3: it should be acknowledged that the existence of controversy doesn't in itself indicate poor management.

P.9, 2.2.3: what is the other 10%? Bottom trawl? Specify. Figure 1 is labeled Figure 2. The map should contain labels to areas referenced in the text.

P.10, 2.3.1: replace "federal councils" with "regional councils." This discussion would be helped by a more straightforward explanation of management under the regional council system, including an organizational chart showing the different roles and responsibilities of management participants.

P.11, 2nd para, line 2: all trawl gear banned, or bottom trawl gear?

P.13, 2.4: say why the probability of illegal fish in the on-shore deliveries is higher. Indicate the % observer coverage on catcher vessels.

P.14, 2nd para: this deserves further discussion. Shouldn't the MSC certification process be robust regardless of the level of controversy?

P.16: more detail should be provided on the process of developing scores. The rationale isn't always clear from the text discussion provided.

P.19, para 1: the term "official" is confusing here.

P.38, stock assessment: Given the dynamic nature of the system, could we imagine ever reaching a point where there would not be considerable uncertainty about the relative effects of fishing and environmental factors?

P.38, harvest strategies, para 2: the regulations don't *attempt* to spread catches out. they *do* spread catches out.

Specific Comments on Indicators

MSC Principle 1

Indicator 1.1.1.1. The harvest control rule is well defined.

100 Scoring Guidepost
The harvest control rule specifies very precisely the way in which ABCs are calculated.

80 Scoring Guidepost
The harvest control rule specifies in general how ABCs are calculated, but there is latitude for variation and interpretation.

60 Scoring Guidepost
The way in which ABCs are determined is ill-defined and varies considerably from year to year.

SCORE 95

Comment: the rationale for the score is clear, although further explanation should be provided as to why earlier changes to the control rule should matter to the score when recent changes have increased the precaution of this rule. This seems like a positive change in the desired direction.

Indicator 1.1.1.2. The harvest control rule is based on appropriate limits to the maximum exploitation rate.

100 Scoring Guidepost
Maximum exploitation rate is defined using precautionary reference points that take account of impacts on target and associated species.

80 Scoring Guidepost
Maximum exploitation rate is defined using internationally recognized limit reference points for target species (such as F_{MSY} or its equivalent).

60 Scoring Guidepost
F_{MSY} or its equivalent is used as a target rather than a limit reference point for exploitation rate.

SCORE 85

Comment: The rationale for this score rests on the absence of explicit accounting for associated species, although it is acknowledged that other regulations are in place to account for these impacts. It isn't clear what specifically is meant by "some way" toward taking account of impacts on associated species and therefore how it results in a specific score of 85. It would be helpful to describe specifically what the precautionary references points for associated species (100 score) would look like.

Indicator 1.1.1.3. The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes.

100 Scoring Guidepost
Exploitation rate is set to zero if stocks are assessed to be below threshold minimum stock sizes.
The threshold minimum stock size is selected to take account of ecological as well as target species impacts.

80 Scoring Guidepost
Exploitation rate is reduced as stocks decline below threshold levels, sufficient to promote rapid stock recovery.
Threshold levels are selected in relation to internationally recognized limit reference points for target species (such as B_{MSY}).

60 scoring guideline
Exploitation rate is not reduced as stock levels decline.

SCORE 85

Comment: the rationale for the score is unclear. The explanatory text provided suggests that the criteria for score 100 are met.

Indicator 1.1.1.4: The harvest control rule results in reductions in ABCs as uncertainty increases.

100 Scoring Guidepost
The harvest control rule includes provision for more conservative regulations as uncertainties about the status of the target species increase.

The harvest control rule (or associated regulations) takes account of uncertainties about impacts on associated species.

80 Scoring Guidepost
The harvest control rule includes provision for more conservative regulations as uncertainties about the status of the target species increase.

60 Scoring Guidepost
The harvest control rule takes limited account of uncertainties in stock status.

SCORE 85

Comment: The rationale for the score is generally clear.

Indicator 1.1.1.5: The harvest strategy can be shown to be precautionary.

100 Scoring Guidepost
The harvest strategy or management procedure has been formally evaluated and demonstrated to be robust to known sources of uncertainty in data and model assumptions.

80 Scoring Guidepost
The harvest strategy has been demonstrated to be precautionary, based on past management decisions and responses to uncertainty.

60 Scoring Guidepost
While including some elements of precaution, the harvest strategy has not proved to be sufficiently precautionary.

SCORE 75

Comment: the rationale for the score is clear.

Indicator 1.1.1.6. The harvest strategy is properly applied.

100 Scoring Guidepost
The agreed harvest strategy is applied without exception.

80 Scoring Guidepost
Decisions about catch limits follow the agreed strategy.

60 Scoring Guidepost
The harvest strategy is not applied consistently, or is regularly over-ridden in ways that result in less precautionary outcomes.

SCORE 95

Comment: The text should include some explanation as to why the team judges that the full 100 score criteria are not met. The text does not make direct reference to the criteria. The text should provide specific examples of the exceptions that have been made to the harvest strategy.

Indicator 1.1.2.1. Current stock sizes are assessed to be above appropriate limit reference points.

100 Scoring Guidepost
Stock assessments show the stock to be above the reference biomass with greater than 90% probability.
The reference biomass is above B_{MSY} and takes into account the needs of predators.

80 Scoring Guidepost
Stock assessments show the stock to be above the reference biomass with greater than 70% probability.
The reference biomass is B_{MSY} or its equivalent and takes into account the natural variability of the stock.

60 Scoring Guidepost
Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent.

SCORE 70

Comment: the rationale for the score is clear.

Indicator 1.1.2.2. Current exploitation rates are below appropriate limit reference points.

100 Scoring Guidepost
Stock assessments show the current exploitation rate to be below the limit reference point with greater than 90% probability.
The limit reference point is below F_{MSY} and takes account of needs of predators.

80 Scoring Guidepost
Stock assessments show the current exploitation rate to be below the limit reference point with greater than 70% probability.
The limit reference point is set at F_{MSY} or equivalent.

60 Scoring Guidepost

Stock assessments show the current exploitation rate to be at or below F_{MSY} or its equivalent.

SCORE 80

Comment: The rationale for the score is unclear. How is the % probability of the exploitation rate determined to distinguish between scoring levels? Citations should be included. Also, further explanation should be provided of the relevance of evaluating the current state of the fishery, with explicit reference to the scoring guidelines. No reference to accounting for predator needs is made in the text.

Indicator 1.1.2.3.1. Assessment models are appropriate to the biology of the stock and the nature of the fishery.

100 Scoring Guidepost
The assessment model is fully spatially structured, and takes account of all sources of mortality on the target species.
Natural mortality is time and age specific and takes explicit account of predation mortality.

80 Scoring Guidepost
The assessment model is state of the art for single species assessments, and takes account of spatial structure and of all likely sources of fishing mortality.
Natural mortality can be age and time invariant, and subsumes predation mortality.

60 Scoring Guidepost
The assessment model does not take proper account of spatial structure and only accounts for fishing mortality from landings from the principle fishery.

SCORE: 85

Comment: the rationale for the score is not completely clear. More explicit reference should be made to the scoring criteria. Is predation mortality the primary concern?

Indicator 1.1.2.3.2. Stock assessment methods are statistically rigorous.

100 Scoring Guidepost
The assessment method has been simulation tested and the results show that major outputs of management interest meet reasonable levels of precision and accuracy.

80 Scoring Guidepost
The assessment uses parameter estimation procedures that take account of observation and process uncertainty and are recognized to comply with standards of statistical analysis.

60 scoring guideline
Model estimation procedures take limited or inappropriate account of statistical uncertainty.

SCORE 90

Comment: the text needs more explanation for the choice of a score at the midpoint between 80 and 100.

Indicator 1.1.2.3.3. Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.

100 Scoring Guidepost
There is a comprehensive evaluation of sensitivities to assumptions, parameters and data for key outputs of interest such as stock abundance.
Uncertainty about key inputs to which assessments are sensitive is taken into account in the harvest strategy.

80 Scoring Guidepost
There is a thorough evaluation of sensitivities to assumptions, parameters and data for key outputs of interest such as stock abundance.
Uncertainty about key inputs to which assessments are sensitive is taken into account in the harvest strategy.

60 Scoring Guidepost
Sensitivity analyses are limited or non-existent.
Results of sensitivity analyses are not properly taken into account in the harvest strategy.

SCORE 80

Comment: The rationale for the score would be strengthened by including a more thorough explanation with reference to the scoring criteria.

Indicator 1.1.2.3.4.1. There is knowledge of the identity of the target species

100 Scoring Guidepost
There is a very high degree of confidence in proper identification and reporting of the target species. (Close to 100%)

80 Scoring Guidepost

There is a high degree of confidence in proper identification and reporting of the target species. (Above 90%)

60 Scoring Guidepost
There is only a moderate degree of confidence in proper identification and reporting of the target species. (Below 80%)

SCORE 100

Comment: The rationale for the score is clear.

Indicator 1.1.2.3.4.2 . There is knowledge of the identity of stocks in the management area of the fishery.

100 Scoring Guidepost
The identity and distribution of all genetically separate stocks is known.
Genetically separate stocks are managed separately.

80 Scoring Guidepost
The identity and distribution of major spawning sites are known.
Management boundaries correspond reasonably well with stock boundaries.
Management boundaries are adjusted as new information on stock boundaries becomes available.

60 Scoring Guidepost
Stock structure is largely unknown.
Uncertainty about correspondence between stocks and management units is ignored.

SCORE 90

Comment: The rationale for the score is clear.

Indicator 1.1.2.3.4.3. There is knowledge of the life history characteristics of the species/stocks.

100 Scoring Guidepost
There is comprehensive knowledge of life history characteristics of all significant stocks.
Dependence of life history parameters on density, environment and ecologically related species is well understood and taken into account.

80 Scoring Guidepost

The knowledge of life history characteristics of all significant stocks is well enough known that changes in the productivity and abundance of the stocks through time and space can be tracked.
Sensitivities to uncertainties in life history parameters are included in assessments.

60 Scoring Guidepost
Life history parameters are uncertain and these uncertainties are not adequately accounted for in assessments or harvest strategies.

SCORE 85

Comment: The rationale for the score is unclear. More specifics should be given to explain the evaluation of "slightly better than 80."

Indicator 1.1.2.3.4.4. There is knowledge of the behavior (movement, migration, feeding, reproduction) of the stocks.

100 Scoring Guidepost
There is comprehensive knowledge of the behavioral ecology of the species and of significant stocks.

80 Scoring Guidepost
The knowledge of the behavioral ecology of the species and of significant stocks is sufficient to undertake robust assessments.

60 Scoring Guidepost
Uncertainty about the behavioral ecology of the species results in significant uncertainty in interpretations of data or in assessments of stock status.

SCORE 90

Comment: The score should have more explanation provided; if there is not comprehensive knowledge of the behavioral ecology, what is lacking?

Indicator 1.1.2.3.4.5. There is information necessary to measure trends in abundance of stocks.

100 Scoring Guidepost
Comprehensive fishery independent surveys of abundance are undertaken on an annual basis covering all significant stocks.
Time series of surveys extend back to the start of significant fishing.
Survey design and sampling methods are statistically rigorous and robust.

80 Scoring Guidepost

Fishery independent surveys of abundance are undertaken on a frequent basis covering all significant spatial components of the population.
Survey design and sampling methods are statistically rigorous and robust.

60 Scoring Guidepost
Fishery independent surveys of abundance are sporadic.
Variations in survey design over time have resulted in significant uncertainties about trends in relative abundance.

SCORE 90

Comment: The rationale for the score is unclear. The text discussion sounds like the criteria for score = 100 are met.

Indicator 1.1.2.3.4.6. There is knowledge of environmental influences on stock dynamics.

100 Scoring Guidepost
Impacts of regime shifts and inter-annual variability in environmental conditions are well understood and incorporated in the assessments.

80 Scoring Guidepost
Impacts of regime shifts on stock abundance have been studied, and where appropriate are taken into account in the assessment.
Impacts of inter-annual variability in environmental conditions on distribution and availability of fish have been studied and inform the stock assessment process.

60 Scoring Guidepost
Environmental variability is largely ignored in assessments.

SCORE 80

Comment: The rationale for the score is clear.

Indicator 1.1.2.3.5.1. All major sources of fishing mortality for the stocks are measured and accounted for.

100 Scoring Guidepost
All sources of fishing mortality, including catches from all fleets, by-catch from other targeted fisheries, and catches outside the management area that impact on the stocks, are measured accurately using a comprehensive at sea observer program.

80 Scoring Guidepost
Catches from the target fishery and significant by-catch fisheries are recorded through an at sea observer program with adequate statistical coverage.

Catches from outside the management area of the target fishery that impact on the target stocks are available, and are used in the assessment.

60 Scoring Guidepost
Catch monitoring is inadequate to estimate significant sources of mortality due to fishing.
Catches from outside the management area that impact significantly on the stocks are largely ignored.

SCORE 85

Comment: Since Russian catches are not at issue as they are in the BSAI document, the text suggests that the scoring criteria for 100 are met. Further explanation of why they are not should be provided.

Indicator 1.1.2.3.5.2. The age and/or size structure of catches are measured.

100 Scoring Guidepost
Comprehensive data on the age and size structure of all significant catches are available.
Comprehensive data on the age and size structure of catches from fishery independent surveys are available.

80 Scoring Guidepost
Data on the age and size structure of catches in the main target fishery are available, with adequate statistical coverage.
Data on the age and size structure of catches from fishery independent surveys are available, with adequate statistical coverage.

60 Scoring Guidepost
Age and/or size data are available but sample sizes are barely adequate.
Analyses do not take proper account of uncertainties in age and/or size samples.

SCORE 90

Comment: The rationale for the score is unclear. Without the problem of the uncertain quality of the Russian data, it would appear to meet the 100 score criteria.

Indicator 1.1.2.3.5.3. Fishing methods and patterns are well understood and recorded.

100 Scoring Guidepost
There is comprehensive knowledge of spatial and temporal patterns of fishing for all fleets impacting the stocks.

There is comprehensive knowledge of the gear used in all significant fisheries impacting the stocks, and the selectivities of the gear are well estimated.

80 Scoring Guidepost
There is comprehensive knowledge of spatial and temporal patterns of fishing for the major target fishery.
There is comprehensive knowledge of the gear used in the major target fishery, and the selectivities of the gear are well estimated.

60 Scoring Guidepost
Spatial and temporal patterns of fishing are not well understood or not recorded.
Changes in the types of gear used over time in the fishery have not been consistently recorded.

SCORE: 100

Comment: the rationale for the score is clear.

Indicator 1.2.1. There is formal and comprehensive monitoring of catches of by-product species in this fishery.

100 Scoring Guidepost
Comprehensive observer coverage provides estimates of catches of all by-product species.

80 Scoring Guidepost
A statistically robust catch sampling program provides estimates of catches of all by-product species.

60 Scoring Guidepost
Catches of some by-product species are not recorded, or are inadequate to assess the impact of pollock fishing on those species.

SCORE 85

Comment: the rationale would be strengthened by a discussion of how the 30% observer coverage is inadequate. What would it take to achieve statistical robustness in the observer sample?

Indicator 1.2.2. There are assessments of significant by-product species.

100 Scoring Guidepost
There are comprehensive assessments of all significant by-product species.

80 Scoring Guidepost
The impacts of the pollock fishery on all significant by-product species are assessed.

60 Scoring Guidepost
The impacts of the pollock fishery on most significant by-product species are assessed.

SCORE 95

Comment: The rationale for the score is unclear. According to the text, the criteria for a score of 100 are met.

Indicator 1.2.3. There are strategies to control catches of significant by-product species in the pollock fishery.

100 Scoring Guidepost
All significant by-product species are subject to robust and precautionary harvest strategies.
This includes constraints on the catch levels on those species from the pollock fishery.

80 Scoring Guidepost
Catches by the pollock fishery are constrained for by-product species subject to TACs. Catches for other significant by-product species are constrained to be within acceptable limits based on assessments of the impacts of the pollock fishery on those species.

60 Scoring Guidepost
Catches on some significant by-catch species are not constrained, or the constraints are ineffective.

SCORE 90

Comment: The rationale for the score is unclear. The text discussion sounds like the criteria for a score of 100 are met.

Indicator 2.1.1. Rules for setting TACs at low stock sizes promote recovery within reasonable time frames.

100 Scoring Guidepost
Exploitation rate is set to zero if stocks are assessed to be below an appropriate threshold minimum stock size.

80 Scoring Guidepost
Exploitation rate is reduced as stocks decline below threshold levels, sufficient to promote rapid stock recovery.

60 Scoring Guidepost

Exploitation rate is not reduced at low stock size, or insufficiently to promote rapid stock recovery.

SCORE 75

Comment: The rationale for the score is clear.

Indicator 2.1.2.1. There is a specific recovery plan in place including measures other than TAC reductions.

100 Scoring Guidepost
There are comprehensive and pre-agreed responses to low stock size that utilize a range of management measures to ensure rapid recovery.

80 Scoring Guidepost
Recovery plans in the event of severe depletion include a range of management measures other than quota reductions.

60 Scoring Guidepost
There are no specific recovery plans in the event of stock depletion other than reductions in TACs.

SCORE 80

Comment: The rationale for the score is clear.

Indicator 3.1.1. The age, sex and genetic structure of the stocks are monitored.

100 Scoring Guidepost
There is comprehensive monitoring of the age and sex structure of the populations.
The genetic structure of the population is monitored.

80 Scoring Guidepost
Monitoring of the age and sex structure of the population is adequate to detect threats to reproductive capacity.
Assessments include an evaluation of depletion of local stocks or spawning units.

60 Scoring Guidepost
Monitoring of the age and sex structure of the population is inadequate to reliably detect threats to reproductive capacity.
No attempt is made to monitor the status of local stocks or spawning units.

SCORE 85

Comment: the rationale for the score could be made clearer with the addition of a more specific discussion of the reasoning. In reference to the scoring criteria, mention should be made as to whether the genetic structure of stocks is monitored.

Indicator 3.1.2. There is knowledge of the dynamics of sex structure in the species.

100 Scoring Guidepost
There is comprehensive knowledge of the dynamics of sex structure in the species.

80 Scoring Guidepost
Knowledge of the sex structure and dynamics are adequate to assess threats to reproductive capacity.

60 Scoring Guidepost
The dynamics of sex structure in the population is largely unknown.

SCORE 100

Comment: The rationale for the score is clear.

Indicator 3.1.3. Information from stock assessment does not indicate problems with reproductive capacity (spawning stock and recruitment).

100 Scoring Guidepost
All data and assessments indicate spawning stock and recruitment at healthy levels for all genetically identifiable stocks.

80 Scoring Guidepost
There are no long-term downward trends in spawning stock levels or recruitment due to impacts of the fishery for local stocks or spawning units.

60 Scoring Guidepost
Long-term downward trends in spawning stock levels and recruitment for some local stocks or spawning units have been detected.

SCORE 70

Comment: the rationale for the score is clear.

MSC Principle 2

General comment on this section: the paragraphs in this section tend to be overly long and therefore hard to read. Breaking them up into shorter paragraphs would be helpful.

Indicator 1.1. There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.

100 Scoring Guidepost
- There is a detailed ecosystem management plan based on well-understood functional relationships between the fishery and components of the ecosystem.
- This forms the basis for a fishery management strategy that restrains impacts on the ecosystem within defined bounds such as using 90% confidence intervals for setting ABCs in the single species context, and establishing a decision rule in the multi-species context similar to that employed in CCAMLR for krill, which explicitly adjusts the single species fishing level downward to account for the needs of other krill consumers in the ecosystem.
- These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high. They address risks associated with point estimates of ABCs and/or address the needs of dependent and related species explicitly.

80 Scoring Guidepost
- There is a management system with ecosystem components based on general knowledge of ecological relationships. This contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity.
- The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem.
- Where uncertainty is high, management to restrain impacts is precautionary.

60 Scoring Guidepost
- Despite attempts to develop a management system that includes ecosystem considerations, impacts of the fishery on the ecosystem have not yet been constrained within agreed and reasonable bounds.

SCORE 75

Comment: the main rationale for this score is buried in the detailed text: that the Ecosystems Considerations chapter has not yet been used in determining ABCs. Because of the length of the explanation, it would be helpful to address each of the three criteria for the 80 score with a statement as to why the each is met or not met.

Indicator 1.2.1. Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.

100 Scoring Guidepost

- Important adverse effects of trawling on benthic and pelagic habitats are measured at intervals on a programmatic basis.
- Particular attention is given to effects of trawling on vulnerable habitats such as those inhabited by corals, and essential fish habitat or fish spawning areas.
- Impacts of fishing on food-fish abundance and distribution are measured, in particular as they affect availability of food for consumers such as endangered, threatened, protected, or icon species.
- Effects of discards and waste discharges on habitats are measured at intervals on a programmatic basis.
- Quantities of gear lost are recorded, and the impact of lost gear on habitats is measured.
- This information is presented in documents that are made available to stakeholders.
- Responsive management changes occur as a direct result of assessment findings.

80 Scoring Guidepost

- The effects of trawling on benthic and pelagic habitats have been assessed and the results presented in documents available to stakeholders.
- Particular attention is given to vulnerable habitats such as those inhabited by corals and those providing essential fish habitat.
- Impacts of fishing on food-fish abundance and distribution have been considered and presented in documents available to stakeholders.
- Effects of discards and waste discharges have been considered and presented in documents available to stakeholders.
- Gear loss has been reviewed and impacts on habitats considered and presented in documents available to stakeholders.

60 Scoring Guidepost

- Adverse effects of trawling on habitats, especially on essential habitat for fish or critical habitat for protected, endangered, threatened or icon species, are documented by sporadic investigations, but many of these are not in the public domain. Coverage of topics is incomplete. Quantitative estimation of impacts is therefore subject to much uncertainty.

SCORE 79

Comment: The text is quite lengthy and needs to be broken up into shorter paragraphs. As written, it is hard to follow the thread of the evaluation of the specific points, and it would help the reader considerably if each of the 5 bullets under “80” were addressed specifically, so that the rationale for the score were more clear. It would also be helpful to address whether the analysis for the 2001 BiOp is the most recent.

Indicator 1.2.2. Assessments are conducted to identify and estimate impacts on invertebrate or vertebrate biodiversity and community structure.

100 Scoring Guidepost

- Effects of trawling on benthic and pelagic animal communities, including changes in species abundance and composition, are measured at intervals on a programmatic basis.
- Impacts of the bycatch take on animal communities are measured at intervals on a programmatic basis.
- Impacts of pollock removal on populations and communities of lower trophic levels are measured at intervals on a programmatic basis.
- Effects of discards and waste discharges on invertebrate communities and populations are measured at intervals on a programmatic basis.
- Effects of discards and waste discharges on vertebrate communities and populations are measured at intervals on a programmatic basis.
- The impacts of lost gear on fish and wildlife are measured at intervals on a programmatic basis.
- This information is presented in documents that are made available to stakeholders.
- Responsive management changes in research priorities and needs occur as a direct result of assessment findings.

80 Scoring Guidepost
- Gear effects from trawling on benthic and pelagic animal communities, including changes in species abundance and composition, have been assessed.
- Impacts of bycatch on animal communities have been assessed.
- Impacts of pollock removal on populations and communities of lower trophic levels have been assessed.
- Effects of discards and waste discharges on invertebrate communities and populations have been assessed.
- Effects of discards and waste discharges on vertebrate communities and populations have been assessed.
- The impacts of lost gear on fish and wildlife have been assessed.
- These assessments have been made available to stakeholders.

60 Scoring Guidepost
- Adverse effects of trawling on animal communities, species and populations, are documented by sporadic investigations, but many of these are not in the public domain. Coverage of topics is incomplete. Quantitative estimation of impacts is therefore subject to much uncertainty.

SCORE 90

Comment: this score and the explanatory text seem inconsistent with that provided for indicator 1.2.1.

Indicator 1.2.3. Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.

100 Scoring Guidepost
- There is detailed information on mechanisms through which the fishery causes adverse effects on habitats.

- There is detailed information on mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.
- There is detailed information on mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.
- There is a coordinated research plan to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.
- The results of research findings are made directly available to management authorities and the public on a programmatic basis.

80 Scoring Guidepost

- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on habitats.
- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.
- There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.
- A coordinated research plan is being developed to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.
- As research proceeds and new information is learned, it is made available to management authorities and the public in a timely manner.

60 Scoring Guidepost

Research into the effects of the fishery on habitats, animal communities, populations, food webs, and ecological functional relationships is carried out in sporadic projects with little strategic planning or coordination. Results therefore provide only a weak basis for adjusting fishery management to reduce impacts.

SCORE 79

Comment: the text explaining the score presents information that suggests that the criteria for a score of 80 have been met. The text appears to be internally inconsistent. The contention that topics of highest ecological importance have not been addressed seems inconsistent with earlier statements in the text that much of the research is directly relevant to the position of pollock within the ecosystem and to the interactions between the pollock fishery and ecosystem processes.

Indicator 1.2.4. There are monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats.

100 Scoring Guidepost
- There is a monitoring program collecting empirical data on habitat metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on invertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on vertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- There is a monitoring program collecting empirical data on food-web and predator prey dynamics most liable to fishery impacts.
- Changes in research needs and priorities occur as a direct result of monitoring.

80 Scoring Guidepost
- A monitoring program is being established to collect empirical data on habitat metrics that are most liable to fishery impacts.
- A monitoring program is being established to collect empirical data on invertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- A monitoring program is being established to collect empirical data on vertebrate biodiversity, community structure and population dynamics, focused on metrics that are most liable to fishery impacts.
- A monitoring program is being developed to collect empirical data on food-web and predator prey dynamics most liable to fishery impacts.
- As monitoring proceeds, and new information is learned, responsive management actions occur.

60 Scoring Guidepost
- Monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats are only weakly developed and are very incomplete. Their outputs do not provide adequate information to set action thresholds for management responses to constrain fishery impacts within agreed and reasonable limits.

SCORE 95

Comment: The rationale for the score is clear.

Indicator 1.3.1. Abundance and/or productivity of animals have been monitored over time such that the fishery can be managed taking into account both natural and fishery impacts on animal abundance

100 Scoring Guidepost
- Population abundances of invertebrates and vertebrates within the fishery area have been measured over a wide spatial scale and over many years so that densities, and

variability in abundance are well known for the more abundant species and for species of particular conservation concern.
- Productivity of animal communities has been measured at a large number of locations across the geographical range of the fishery and in a large number of years.
- Spatial, and temporal, variations in productivity, and in trophic relationships have been measured.

80 Scoring Guidepost
- Studies of invertebrate and vertebrate population densities across the geographical range of the fishery are being carried out on species identified as being affected by fishing.
- Studies of trophic relationships, production, and spatial variations in animal abundance and productivity, are being carried out.

60 Scoring Guidepost
- Studies of animal population densities, trophic relationships, production and spatial variation in animal abundance have been carried out sporadically, such that the parameters that affect the natural dynamics of these processes are not understood well enough to identify important perturbations caused by the fishery against a noisy background of natural variations.

SCORE 95

Comment: The score for this indicator, and the explanatory text, seem inconsistent with that in 1.2.3. Additionally, given the information presented in the text, it is not clear why the criteria for a score of 100 have not been met. More specific explanation should be provided.

Indicator 1.3.2. Communities of animals in the habitats likely to be affected by the fishery are known.

The intention of this performance indicator is to evaluate the extent of knowledge of animal communities in habitats thought to be vulnerable to impacts of the fishery.

100 Scoring Guidepost
- The distribution of habitats has been mapped over the geographical range of the fishery, with particular attention to the occurrence of habitats that are liable to be affected by fishing.
- Invertebrate, and vertebrate, community compositions have been measured for a large number of sites across the geographical range of the fishery and over a large number of years.
- Changes in habitat and animal distributions over time are measured.

80 Scoring Guidepost
- There is basic knowledge of the distributions of different types of habitat present across the geographical range of the fishery.

- There is basic knowledge of the distributions of invertebrate, and vertebrate, community compositions for most of these habitat types
- There is some general information about whether major changes in habitats and/or animal distribution patterns have occurred over time.

60 Scoring Guidepost
- Information on the distributions of habitats and the species of animals in these habitats is patchy and incomplete.

SCORE 92

Comment: Comment: the rationale for the score is clear.

Indicator 1.3.3. Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.

100 Scoring Guidepost
- There is sufficient understanding of the information collected on functional relationships between fisheries actions and responses of animal populations and communities such that management decisions can be made to mitigate effects from fishing.
- Information on changes in the status of animal populations and communities is provided in a timely fashion such that management decisions can be made, where appropriate, to mitigate the effects of fishing.

80 Scoring Guidepost
- At a minimum, estimates of empirical relationships between fisheries actions and responses of animal populations and communities have been made and provided to management for consideration in reducing the effects of fishing on animal species and communities and for informing research decisions.
- Where it seems to be appropriate, management decisions respond to changes in the status of animal populations and communities, on a precautionary basis.

60 Scoring Guidepost
- For species that have been identified as effected by fishing, there is insufficient knowledge to estimate spatial and temporal variations in abundances of animal populations and communities adequate to permit management decisions to be made in response to changes in the status of animal populations and communities.

SCORE 75

Comment: The rationale for the score is clear. Re requirements set in the condition: do the data exist to serve as the basis for the required reports?

Indicator 2.1. The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.

100 Scoring Guidepost
An ecological risk assessment has been conducted, based on knowledge of functional relationships, to determine the potential impacts of the fishery on the genetic, species and population level biodiversity endangered, threatened or protected species. Fishery management is constrained to minimize impacts on the basis of this risk assessment. Impacts are held below levels that would be unacceptable.

80 Scoring Guidepost
An assessment has been conducted to estimate the potential impacts of the fishery on the genetic, species and population level biodiversity for endangered, threatened or protected species. Fisheries management has shown itself to be responsive to this risk assessment and attempts to minimize impacts.

60 Scoring Guidepost
There is inadequate knowledge of endangered, threatened or protected species such that important impacts of the fishery on their biodiversity cannot be identified and it is impossible to adjust management to confidently expect reductions in these impacts.

SCORE 79

Comment: The rationale for the score is clear.

Indicator 2.2.1. The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act

100 Scoring Guidepost
- There is a detailed management plan that includes ecosystem considerations based on the functional relationships between the fishery and endangered, threatened, protected or icon species.
- This forms the basis for a fishery management strategy that restrains impacts on endangered, threatened, protected or icon species within defined bounds.
- These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high.

80 Scoring Guidepost
- There is a management strategy with consideration for ecological impacts on endangered, threatened, protected and icon species.
- This assists fishery management to adjust to reduce impacts on endangered, threatened, protected or icon species.
- Where uncertainty is high, management to restrain impacts is precautionary.

60 Scoring Guidepost

- Ecosystem aspects of management are treated as minor, 'bolt-on' aspects of the management system of the fishery, which is essentially single-species target stock management, adapted where necessary to comply with other legislation.

SCORE 75

Comment: The rationale for the score is unclear. More specifics should be provided as to how management is not sufficiently precautionary, especially considering earlier descriptions provided under S1 as to how adjustments of the TAC have been made in response to uncertainty. What would "more precautionary" look like? Given the information provided in the text, it is hard to see why the criteria for 80 score have not been met or exceeded. Also, the statement that peer review of the telemetry data wasn't done seems inconsistent with the text under 2.2.2.

Indicator 2.2.2. Management of the fishery includes provisions for acquiring, integrating and synthesizing new scientific information from protected species research, management and recovery programs outside fishery management.

100 Scoring Guidepost

- The management system fully recognizes applicable legislative and institutional responsibilities outside fishery management regarding protected species.
- The management system has established mechanisms to conduct integrated and synthetic environmental assessment.
- Relevant data from protected species research, management and recovery programs are integrated into the fishery management system to inform policy.

80 Scoring Guidepost

- The management system recognizes applicable legislative and institutional responsibilities outside fishery management regarding protected species.

60 Scoring Guidepost

- The management system is reactive rather than proactive.

SCORE 95

Comment: The rationale for the score is not completely clear. What specifically does it mean to say that the relevant research data informs policy but is not fully integrated into management?

Indicator 2.3.1. Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.

100 Scoring Guidepost

- Direct and indirect impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size (defined as causing a significant decrease in population size or a significant risk of local extinction).

80 Scoring Guidepost
- Direct impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size.
- Indirect impacts of fishing (including food competition, changes in foraging behavior, disruption to animals and prey fields) on all protected, endangered, threatened and icon species have been examined and the evidence suggests that these impacts are below levels that harm population size.
- Research needed to measure indirect impacts of fishing on all protected, endangered, threatened, and icon species is being carried out.

60 Scoring Guidepost
- Knowledge of direct and indirect impacts of the fishery on protected, endangered, threatened and icon species is fragmented, incomplete and inadequate to permit management to develop methods to limit these impacts to within agreed and reasonable bounds. Research being carried out is not adequately focused to provide the missing information.

SCORE 79

Comment: The rationale for the score is clear. However, more detail should be provided in the condition. Does the required study have a specified time frame or scope? Is this indicated in the NRC report?

Indicator 2.3.2. Permitted take levels for endangered and threatened species, and threshold levels of unacceptable impact have been identified for protected or icon species in fished areas and the fishery is managed in accordance with national and/or international laws on endangered and threatened species. Threshold levels of unacceptable impact have been identified for habitats in fished areas.

100 Scoring Guidepost
- Permitted take levels for endangered and threatened species, and threshold levels of unacceptable take of protected and icon species have been set at levels that can be expected to keep impact well below levels that would harm population size and are in accordance with international and/or national laws.

80 Scoring Guidepost
- Permitted take levels for endangered and threatened species have been set at levels that can be expected to keep impact well below levels that harm population size and are in accordance with international and/or national laws

- Threshold levels of unacceptable take of protected and icon species have been set at levels that can be expected to keep impact below levels that harm population size.

60 Scoring Guidepost
- Permitted take levels for endangered and threatened species, or threshold levels of unacceptable take for protected and icon species are set at levels that may still permit damaging impacts on these populations to continue, because they are not sufficiently precautionary in relation to high levels of uncertainty in the fishery or animal population dynamics.

SCORE 95

Comment: The rationale for the score is unclear. The text implies that the criteria for a 100 score have been met. It's not clear how pelagic trawl gear can have any impact on benthic habitat. More explanation should be provided.

Indicator 2.3.3. Research is carried out to allow impacts of the fishery on endangered, threatened, protected and icon species to be identified and measured.

100 Scoring Guidepost
There is a regular and continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on endangered, threatened, protected and icon species, not only considering direct take issues, but also indirect effects on food availability, foraging behavior, disturbance, etc.

80 Scoring Guidepost
The research program is developing into a regular and continuing effort to determine mechanisms through which the fishery causes adverse effects on endangered, threatened, protected and icon species, not only considering direct take issues, but also indirect effects on food availability, foraging behavior, disturbance, etc.

60 Scoring Guidepost
The existing research program may contribute to a better understanding of the relationships between the fishery and endangered, threatened, protected and icon species, but is not sufficiently focused on the functional relationships that need to be understood in order to permit significant improvements to management.

SCORE 79

Comment: The rationale for the score doesn't address all the criteria in the scoring guidepost. The 80 guidepost requires that the research program is developing into a regular and continuing effort, and that it address direct and indirect effects. The text would be more helpful if it structured the explanation around these two key aspects to make the rationale for the score more clear.

Indicator 2.3.4. There are monitoring programs to assess fishery impacts on endangered, threatened, protected or icon species that have been identified as vulnerable to fishing impacts.

100 Scoring Guidepost

- Population sizes and demography of endangered, threatened, protected and icon species that are vulnerable to fishery impacts are monitored to the level that will permit impacts of the fishery to be measured and trends reported.

80 Scoring Guidepost

- Population sizes and demography of protected and icon species that are vulnerable to fishery impacts are monitored, but with varying levels of effectiveness in different locations and not necessarily following standardized protocols.
- Information necessary to properly manage the fishery to comply with existing laws on endangered and threatened species is being collected.

60 Scoring Guidepost

- Monitoring programs exist, but are inadequate and/or incomplete.

SCORE 95

Comment: The rationale for the score is clear.

Indicator 2.4.1. Functional relationships involving endangered, threatened, protected or icon species are adequately understood for the purposes of minimizing the fishery's impacts on such species.

100 Scoring Guidepost

- Knowledge of relevant species' ecology is sufficient to allow functional relationships of endangered, threatened, protected and icon species to be described, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.

80 Scoring Guidepost

- There is basic knowledge of the ecology of endangered, threatened, protected and icon species in the fishery area.
- Research is being conducted to determine the functional relationships of endangered, threatened, protected and icon species, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.
- A research plan/strategy is in place to ensure that the research being conducted is continued until there is an understanding about the functional relationships of endangered, threatened, protected and icon species, especially functional relationships between increased mortality and population dynamics, and between animal foraging success and prey abundance/spatial distribution.

60 Scoring Guidepost

- Too little is known about the functional relationships between endangered, threatened, protected and icon species and the fishery to permit the fishery impacts on such species to be significantly reduced by alterations in fishery management, and there is insufficient effort to promote and conduct research that will lead to better management of the situation.

SCORE 80

Comment: The rationale for the score is clear. The text addresses the criteria of the 80 guidepost, making the explanation quite specific to the score level.

Indicator 2.4.2.Trophic (predator-prey) relationships, especially those involving endangered, threatened, protected or icon species, are adequately understood for the purposes of minimizing the fishery's impacts on such trophic relationships.

The intention of this performance indicator is to evaluate the extent of knowledge of dietary habits of animals, especially endangered, threatened, protected or icon species, that may be affected by the fishery altering food availability. The species of interest here include all marine mammals, certain sharks, sea turtles and seabirds.

100 Scoring Guidepost

- Diets and foraging requirements of important animals in the food webs, especially endangered, threatened, protected, and icon species are well known.

80 Scoring Guidepost

- There is a basic understanding of the diets and foraging behavior of important animals in the food web, especially endangered, threatened, protected and icon species.
- Further research on this topic is being carried out, especially with respect to species thought to be vulnerable to indirect impacts from the fishery.

60 Scoring Guidepost

- Too little is known about the trophic relationships, diets and feeding ecology of endangered, threatened, protected and icon species to permit the fishery impacts on such species to be significantly reduced by alterations in fishery management, and there is insufficient effort to promote and conduct research that will lead to better management of the situation.

SCORE 90

Comment: The rationale for the score is unclear. Information provided in the text suggests that the criteria for a 100 score are met.

Indicator 2.4.3. Population sizes and population trends of endangered, threatened, protected or icon species are adequately known, together with the nature and distributions of their essential habitats.

100 Scoring Guidepost

- There are reliable and up-to-date data on total population sizes, locations of breeding sites, numbers breeding at each site, and also on the spatial distributions of animals outside the breeding season, for all species of animals thought to be vulnerable to impacts of the fishery.
- Population trends, especially trends in breeding numbers and in breeding productivity, are known over a period of years relevant to the duration and scale of the fishery.
- Population estimates and trends are known for a period prior to when the fishery began operating, or when the fishery was small enough to have negligible impact on these parameters.
- Where the occurrence of fishery impacts on a particular animal species is uncertain, the animal species is included in the list in order to be precautionary.

80 Scoring Guidepost

- The presence and distributions of endangered, threatened, protected and icon species in the area of the fishery are known.
- There is knowledge of the major species and their habitats in the area of the fishery, and relevant aspects of their spatial and seasonal distributions.
- Research is being undertaken as part of an overall research plan or strategy to add to the existing basic knowledge of numbers, distribution, demography and population trends.

60 Scoring Guidepost

- Information on habitats, numbers, distributions and population trends of endangered, threatened, protected and icon species in the area of the fishery are at best vaguely known.

SCORE 90

Comment: is the statement "the nature and distribution of essential habitat is not well known for most species" consistent with earlier statements on what is known about the ecological system, e.g. in 2.4.1 and 2.4.2 and on the Ecosystems Considerations chapter in the FMP?

Indicator 3.1. Management strategies include provision for restrictions to the fishery to enable recovery of populations of impacted species that have been depleted by previous actions of this fishery.

100 Scoring Guidepost

The ecosystem components of the management plan include mechanisms to reduce fishing in locations or ways that remove impacts on depleted species to the extent necessary to permit the impacted species' populations to recover and rebuild.

80 Scoring Guidepost
The ecosystem components of the management plan are being improved to provide a framework for decisions about ways to modify fishing to reduce impacts on depleted species, to allow them to recover and rebuild.

60 Scoring Guidepost
Management takes account of statutory requirements to protect endangered and threatened species but contains little or no provision for recovery of populations of other impacted species that do not enjoy ESA protection.

SCORE 80

Comment: The rationale would be strengthened if the text addressed the conditions of the 80 score guidepost directly: i.e. whether the ecosystem components in the FMP provide a framework for decisionmaking about reducing impacts on depleted species. The explanation is not directly related to these criteria.

Indicator 3.2. Changes in management have been implemented in order to recover affected communities of animals, habitats, or populations of impacted species that are believed to have been depleted by previous actions of this fishery.

100 Scoring Guidepost
- Where there is evidence of depletion of animal communities, damage to habitats or depletion of populations (endangered, threatened, protected and icon species, or species recognized by leading scientific information as key component to ecosystem sustainability in the area of the fishery) the fishery management has been altered in a timely manner to reduce the impact to a level that results in recovery and rebuilding of affected populations.

80 Scoring Guidepost
- Management responds in a timely manner by altering fishery regulations and practice in ways that are thought to reduce impacts to an extent that should lead to population recovery and rebuilding of species (endangered, threatened, protected and icon species, or species recognized by leading scientific information as key component to ecosystem sustainability in the area of the fishery).
- A monitoring program is put in place to assess whether or not management measures are effective.

60 Scoring Guidepost
- Management responds to reduce impacts on endangered and threatened species but it is unclear whether changes are adequate to achieve recovery and rebuilding.

SCORE 79

Comment: The rationale for the score is unclear. Information provided in the text suggests that a score of less than 79 would be warranted. More explanation should be provided.

Indicator 3.3. There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.

100 Scoring Guidepost
Alterations to fishing to recover and rebuild depleted species are based on a sound understanding of functional relationships between the impacted population and the fishery. This includes understanding predator-prey dynamics, species interactions, prey abundance/spatial distribution, foraging behavior, food web requirements and habitat needs.

80 Scoring Guidepost
Alterations to fishing to recover and rebuild depleted species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts.

60 Scoring Guidepost
Alterations to fishing to recover and rebuild depleted species are based on incomplete data, and are of largely unknown efficacy.

SCORE 79

Comment: The rationale for the score is unclear. Information provided in the text suggests that a score of less than 79 would be warranted. More explanation should be provided.

MSC Principle 3

Comments on this section

The writing style in this section is less scientific than the previous two sections. In places it waxes lyrical at the expense of straightforward presentation of information that can be documented. The section does not convey a scientific approach to the assessment of management performance. At the least, editing should remove phrases and terms that are open to different meanings.

The lack of documentation of evidence cited as the basis for conclusions is a major weakness of this section. Failure to document statements undermines confidence in the conclusions and leaves the scoring rationale open to question. In its present form the section is vulnerable to challenge in many aspects.

The section would be better served if a clear description of the regional fishery management council structure were presented in graphic and text form. An explanation of the NPFMC structure (membership, staff, advisory bodies, FMPs, etc) should also be presented. The rather loose description of the NPFMC and management system is confusing.

The same comments on the background section provided for the BSAI report apply here.

Indicator 1.1. The management system incorporates and applies an adaptive and precautionary exploited stock strategy *[Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]*

100 Scoring Guidepost
- The management plan includes long-term stock management objectives that are explicit and consistent with MSC Principles and Criteria .
- The harvest strategy, including catch control rule, is explicitly precautionary, accounting for variances in survey estimates, uncertainties in stock assessment advice, and other risk factors.
- Annual assessments are undertaken for all components of the population, based on sound long-term data, including data developed prior to inception of the pollock fishery, if any.

80 Scoring Guidepost
- Management objectives seek to maintain stocks at high levels of productivity.
- The harvest strategy, including catch control rule, is explicitly precautionary.
- Annual assessments are based on best available information from ongoing data collection efforts.

60 Scoring Guidepost
- There is no agreed harvest control rule in place.
- The harvest control strategy does not take account of uncertainties in stock status.
- The harvest control strategy can not be shown to be precautionary.
- The harvest control strategy is not applied consistently or is overridden .

SCORE 95

Comment: the rationale for the score is clear.

Indicator 1.2. The management system incorporates and applies an effective strategy to manage ecological impacts of fishing *[Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]*

100 Scoring Guidepost
- The management system includes a management plan with clear long-term objectives for managing ecological impacts of fishing that are explicit and consistent with MSC Principles and Criteria
- The management plan includes ecosystem components and is explicitly precautionary, accounting as appropriate for uncertainty.

- The management plan contains ecosystem components that take into account all significant (identified or estimated) ecological impacts of the fishery, including but not limited to food competition, disruption of prey fields, disruption of foraging behavior, disruption to animals, and alterations in food webs and habitats.
- The management plan includes mechanisms (such as representative areas set aside as no-take zones) to minimize, where appropriate, identified impacts from fishing.

80 Scoring Guidepost
- The management system includes a management plan that explicitly takes into account ecological impacts of the fishery
- Regulation of the fishery to manage ecological impacts of fishing is precautionary
- Assessments (empirical or other) of likely significant ecological impacts of fishing are undertaken on a regular basis
- Control mechanisms are used where appropriate to minimize impacts

60 Scoring Guidepost
- The management system does not take into account or attempt to limit significantly the adverse ecological impacts of the fishery

SCORE 75

Comment: the rationale for the score is not clear. The text discussion presents solid information indicating that the criteria for the 80 scoring guidepost are met despite stated concerns that management may not be taking a systematic enough approach to incorporating ecological information into a long-term strategic plan (scoring guidepost 100 criteria). The team notes the high quality of information in the annual Ecosystems Considerations report. The team downgrades the score on the basis of a judgment that the management process is too slow to incorporate ecological information into assessment of fisheries impacts, but does not present explanation or documentation of this problem. A stronger rationale should be provided for this score.

Indicator 1.3. The management system incorporates and applies an effective strategy to manage the socioeconomic impacts of the fishery *[Relates to MSC Criteria 3.2, 3.4, 3.6, 3.7*]

100 Scoring Guidepost
- The fishery is free from subsidies that directly and substantially promote overfishing or ecosystem degradation
- Participants in the fishery have access to short- and long-term economic incentives that, taken alone or in combination with other management measures, act to prevent overfishing and ecosystem degradation
- Economic rent from the pollock fishery is shared in a manner that recognizes those dependent of fishing for food and livelihood and does not promote overfishing or ecosystem degradation.

- New entrants are accommodated without unduly disrupting other participants or undermining fishery and ecosystem management goals.
- The fishery management system provides for long-term predictability or other risk management and hedging tools such that rational and prudent investments can be made that are consistent with ecological sustainability (i.e. no overfishing or ecosystem degradation).
- The fishery management system continually seeks to understand social and economic consequences of management decisions and seeks and accepts input from all stakeholders regarding management decisions.

80 Scoring Guidepost

- The fishery is free from subsidies that directly and substantially promote overfishing or ecosystem degradation
- Economic rent from the pollock fishery is shared by communities historically dependent on pollock and those dependent on other ecosystem resources affected by the pollock fishery, including subsistence fisheries, if any
- The fishery management system provides for long-term predictability or other risk management and hedging tools needed for rational and prudent investment
- The fishery management system seeks to understand social and economic consequences of decision-making

60 Scoring Guidepost

- The fishery management system creates economic incentives for overharvest or unproductive use of harvested species, or ecosystem degradation.
- The fishery management system does not recognize the rights of subsistence fishers or others dependent on fishing for a livelihood.
- The fishery management system does not seek stakeholder input regarding management decisions.
- The significant environmental and social externalities of the fishery are poorly understood or, if understood, generally not internalized by the fishery

SCORE 80

Comment: the rationale for the score is not completely clear. The text should address the elements of the 100 scoring guidepost directly to demonstrate the particular elements of the 100 score criteria that are absent. The text cites its concern with what appears to be inadequate consideration of economic interests of Native Alaskan communities. Documentation should be provided of the information that creates this concern. The text also cites concern that AFA did not receive due consideration of ecological impacts. It is not clear which impacts are of particular concern and information should be provided identifying these and assessing the degree to which they are potential or realized.

Indicator 1.4.1. There is a research strategy to support the harvest strategy and to address information needed to support the identification and mitigation of ecosystem impacts *[Relates to MSC Criterion 3. 8]*

100 Scoring Guidepost

- Stable, well-led, diverse and objective research planning organization
- Ample and secure funding to support near and long-term research needs
- Significant and regular agreement between fishery managers and research scientists on research needs and priorities in the fishery
- Continuing, significant progress in scientific understanding of target and impacted species
- Continuing, significant progress in application of scientific understanding to harvest strategy
- Continuing, significant progress in scientific understanding of ecosystem impacts of fishery
- Continuing, significant progress in application of scientific understanding to ecosystem management strategy
- Continuing, significant progress in understanding of social and economic considerations related to the fishery
- Continuing, significant progress in application of social and economic understanding to management of the fishery

80 Scoring Guidepost

- Stable, well-led, diverse and objective research planning organization
- Funding to support near-term research needs
- Regular agreement between fishery managers and research scientists on near term research needs and priorities in the fishery
- Evident progress in scientific understanding related to target and impacted species
- Evident application of scientific understanding to harvest strategy
- Evident progress in scientific understanding related to ecosystem impacts of fishery
- Evident application of scientific understanding to strategy for managing ecological impacts of fishing
- Evident progress in understanding of social and economic considerations related to the fishery
- Evident application of social and economic understanding to management of the fishery

60 Scoring Guidepost

- Research is carried out in sporadic projects with little strategic planning or coordination
- Fishery managers fail to support research with the potential to reduce or otherwise constrain harvest levels
- Fishery mangers fail to apply research results in a rational or objective manner
- Fishery managers on average do not heed the advice of research scientists in the fishery

SCORE 80

Comment: the rationale for the score is not completely clear. The text presents substantial information about the positive aspects of NPFMC research, noting the significant research support. No explanatory information is provided documenting the points of concern articulated by the team. These include uncertainty about the stability of long-term research funding, the lack of a demonstrated robust commitment to the application of information on ecological impacts, and a lack of objectivity and instability in research planning and research review. Documentation and a complete explanation of these concerns in the text should be provided.

Indicator 2.1. The fishery is managed and conducted in a manner that respects international conventions and agreements and not under any controversial unilateral exemption to an international agreement *[Relates to MSC Criterion 3.1]*

100 Scoring Guidepost

- The management system is in full compliance with all aspects of applicable international law, including but not limited to international law on specie and ecosystem protection, indigenous cultures, property, labor, law enforcement, communications, and jurisdictional boundaries.
- The management system does not employ or in any manner seek to operate within any exemption to otherwise applicable international law
- The management system regularly and consistently seeks and uses appropriately the advice of experts in international law, including independent experts.

80 Scoring Guidepost

- The management system is in full compliance with international fisheries and environmental law
- The management system does not operate under any controversial exemption to an international fisheries or environment-related agreement
- The management system has access to and makes use of experts in international law

60 Scoring Guidepost

- The management system can be shown to have a consistent pattern of failing to reliably monitor and act to assure its compliance with international fisheries and environmental law

SCORE 100

Comment: the rationale for the score is clear.

Indicator 2.2. The fishery is managed and conducted in a manner that respects domestic law *[Relates to MSC Criterion 3.16]*

100 Scoring Guidepost

- The management system is in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found at any time to be in willful violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the pollock fishery
- No officer or agent of the management system, including its component entities, has at any time been found to be in contempt of any domestic court of jurisdiction on any matter related to performance of official duties on behalf of the management system concerning the pollock fishery
- The management system regularly and consistently seeks and uses appropriately the advice of experts in domestic law, including independent experts

80 Scoring Guidepost

- The management system makes consistent, good faith efforts to be in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found repeatedly by any domestic court of jurisdiction to be in violation of any significant aspect of any domestic law related to protection of the human or natural environment, individual species, ecosystems, or fishery dependent communities
- The management system has access to and makes use of experts in domestic law.

60 Scoring Guidepost

- The management system fails to reliably monitor and assure its compliance with all substantive and procedural aspects of applicable domestic law
- Harvest management decisions made by fishery managers are regularly overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law

SCORE 62

Comment: the rationale for the score is unclear. The basis for the score appears to be a distinction between "respect" for domestic law and "enthusiasm or alacrity or perfection" in adherence to it. None of these terms has obvious definitions or relevance to the scoring guidelines, which are articulated in terms of "compliance", "good faith efforts", "willful violation", "contempt", and regular seeking and use of legal advice. Ample evidence is presented of actions taken to comply with domestic law and court orders. The point is made in the text that disagreement among stakeholders does not in itself indicate a failure to respect domestic law, but that a pattern of court findings against agency actions does indicate that compliance is lacking.

Offered as additional evidence of a lack of good faith compliance is the use of insufficiently reviewed sea lion tracking data in the 2001 BiOp that created an impression of less rigorous standards. The specific information that forms this impression should be included, along with an indication as to whether more recent

data (since 2001) has been reviewed. More detail and documentation on how NMFS failed to provide proper analysis of actions would help clarify the team's conclusions. An update of the progress NMFS has made in bringing NP groundfish fisheries into full compliance with NEPA and ESA and what it has left to do in 2004 would also be informative. What is the current status of the PSEIS? Does it address concerns about NEPA and ESA compliance? Did NMFS meet the June 2003 deadline for updating the SSL BiOP? Because so much of the text in this section discusses progress and new actions, it should be updated to be as current as possible.

Indicator 2.3. The fishery is managed or conducted in a manner that observes legal and customary rights *[Relates to MSC Criterion 3.4]*

100 Scoring Guidepost

- The fishery management system recognizes and makes affirmative efforts to enhance the security and value of property rights in the fishery
- The fishery management system recognizes and makes affirmative efforts to enhance the security and value of subsistence and customary rights in the fishery
- The fishery management system provides a fair, efficient, predictable means to avoid and reconcile conflicts between legal and customary rights.

80 Scoring Guidepost

- The fishery management system recognizes property rights in the fishery
- The fishery management system recognizes subsistence and customary rights in the fishery
- The fishery management system provides a fair means to avoid and reconcile conflicts between legal and customary rights.

60 Scoring Guidepost

- The fishery management system is largely indifferent to, or makes inadequate efforts to understand and recognize property, subsistence, and customary rights, if any, in the fishery.

SCORE 90

Comment: the rationale for the score is not completely clear. It would help to have explicit discussion of the score 100 guidelines to indicate where they are not met.

Indicator 3.1. The management system solicits and takes account of relevant information *[Relates to MSC Criterion 3.2]*

100 Scoring Guidepost

- The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information

- The management system seeks affirmatively to acquire information that may be controversial or reveal weaknesses in the management system, including matters related to compliance with applicable international and domestic law
- The management system evaluates information in an unbiased, objective manner and does not discriminate against information solely upon the basis of the identity of stakeholder category from which it was supplied

80 Scoring Guidepost

- The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information
- The management system accepts information that may be controversial or reveal weaknesses in the management system
- The management system shows evidence of listening and responding to diverse points of view

60 Scoring Guidepost

- The management system presents significant overt or implicit resistance to introduction or consideration of new information that is potentially relevant to the management of the fishery

SCORE 78

Comment: the rationale for the score is unclear. The text acknowledges that the NPFMC solicits and considers a large amount of scientific information, and takes action to keep management participants informed, but cites concern about resistance within the management system to information provided from outside the scientific and management communities. The presentation about concerns is rather vague, and the text should address and document specific instances of this weakness in the information system so that the reader is better informed on the particulars. Additionally, the text should present the findings in the context of the requirement to use the best available science as a basis for decision-making, distinguishing scientific information and its review from other types of information that stakeholders present to the management system. The text refers to opinions of stakeholders in the condition section. The text should explicitly address the role that opinions should play in the provision of management information and how they should be addressed in the review process.

The inclusion of the long and abstract academic text on the pathologies of agency decisionmaking is distracting and unnecessary, and should be removed. If the components of this theory are relevant to the NPFMC context, then key points should be summarized with specific evidence cited for their application to the NPFMC case.

Indicator 3.2. The management system involves all categories of stakeholders appropriately on a regular, integral, explicit basis *[Relates to MSC Criterion 3.2*]

100 Scoring Guidepost
- The management system provides for direct representation of all significant public and private stakeholder interests
- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system produces decisions that take fully into account and address all significant stakeholder interests
- The management system operates pursuant to stable, predictable, objective procedures

80 Scoring Guidepost
- The management system provides for involvement by all significant public and private stakeholders and consideration of their interests
- The management system operates pursuant to stable, predictable, objective procedures
- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests

60 Scoring Guidepost
- The management system regularly omits involvement by one or more significant stakeholder interest
- The management system fails to follow its own official or formal procedures or routinely observes “unofficial” or “informal” decision making procedures that deviate significantly from formal or official procedures

SCORE 80

Comment: the rationale for the score is unclear because the text suffers from lack of documentation of information used to support conclusions. Additionally, the text seems internally inconsistent, stating that the management system is very open and encourages participation by all interested stakeholders, yet later stating that the system has yet to fully accommodate conservation stakeholders. More specifics as to the nature of the current deficiency and a description of what full accommodation would look like might resolve this apparent inconsistency.

The text should acknowledge that mandatory council seats are specified by Congress in the MSFCMA, rather than being determined by the NPFMC. The recommendation that more “forward thinking” inform the process of council appointments to various bodies implies that conservation expertise is not represented at all, but this contradicts earlier text indicating conservation membership on the AP. Additionally, the text repeatedly emphasizes that the SSC consistently behaves in a way that is quite conservative.

Documentation should be provided for specific examples of instances of instability caused by lack of enfranchisement of the conservation community, and by actions taken by commercial fishing interests. The footnote on watershed management

doesn't seem on point, although the reference on conflict resolution has obvious relevance.

Indicator 3.3. The management system assesses relevant information pursuant to objective, fair, equitable processes. ***[Relates to MSC Criterion 3.2]***

100 Scoring Guidepost
- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system does not place an unfair burden of proof on proposals of a certain type or arising from a particular category of stakeholder
- The management system attempts to quantify and document the degree of risk imposed on different species, ecological systems, and stakeholders by particular decisions or courses of action, particularly in light of scientific uncertainty.

80 Scoring Guidepost
- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests
- The management system attempts to characterize and reveal the risks of harm to different species, ecological systems, and stakeholders arising from management decision-making.

60 Scoring Guidepost
- The management system regularly fails to analyze potentially significant information concerning the fishery or its impacts
- The management system lacks a rational approach to identify and reduce sources of uncertainty affecting the quality of management decision-making

SCORE 80

Comment: the rationale for the score is not entirely clear. Given the information and conclusions presented, the text should be expanded to make explicit comparison to the criteria for the 100 score to indicate why the process does not meet the 100 level.

Indicator 3.4. The management system provides for timely and fair resolution of disagreements ***[Relates to MSC Criteria 3.2, 3.5]***

100 Scoring Guidepost
- The management system has established mechanisms for resolution of disputes at the principal levels of, and for major issues arising within, the system
- The management system provides for appropriate documentation of the nature and resolution of disputes

- The management system's dispute resolution procedures show evidence of being open to and used by a variety of participants and stakeholders
- The management system's dispute resolution procedures show no evidence of a pattern of discrimination against any participants or significant stakeholder interest

80 Scoring Guidepost
- The management system has established mechanisms for resolution of significant disputes arising within the system
- The management system's dispute resolution procedures show evidence of being open to a variety of participants and stakeholders

60 Scoring Guidepost
- Although dispute resolution mechanisms are in place, the management system fails to demonstrate meaningful progress toward resolution of outstanding disputes

SCORE 80

Comment: the rationale for the score would be strengthened by the addition of specific examples of how the dispute resolution process is weaker at lower levels, the types of disputes that are chronic, and their impact on management.

Indicator 3.5. The management system presents managers with clear, useful, relevant information, including advice *[Relates to MSC Criterion 3.2]*

100 SCORING GUIDEPOST
- The management system regularly presents decision makers with a reasonable number of carefully analyzed alternatives for action that fall in, and extend to the margins of a range that includes all legally permissible options
- The management system provides decision makers with time and opportunity for deliberation in a manner suitable for the nature of the decisions under consideration
- The management system shows evidence of a pattern of behavior by decision makers that reveals that they have found the information provided to them to be useful, adequate in scope and detail, and otherwise appropriate to the performance of their duties

80 Scoring Guidepost
- The management system regularly presents decision makers with a reasonable number of carefully analyzed alternatives for action that fall in a range that includes all legally permissible options proposed by stakeholders
- The management system's decision makers show evidence of relying consistently upon the information provided to them.

60 Scoring Guidepost
- The management system's decision makers repeatedly base decisions on information or factors not developed or presented through the "official" or routine process

- The management system's decision makers repeatedly act in a manner contrary to the advice developed or presented through the "official" or routine process
- The management system's decision makers appear frequently to be unaware of the consequences of or risks inherent in their decisions

SCORE 75

Comment: the rationale for the score would be strengthened by more explanation of how the Council fails to receive meaningful analysis of a full range of alternatives in advance of decisionmaking. The evidence that the Council makes decisions on actions that have not received full evaluation should be cited.

Indicator 4.1.1. Catch levels are set to maintain high productivity of the target population and the ecosystem *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost
- Catch levels are set regularly in a manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are set regularly in a manner directly tied to, and limited by, specific ecological productivity goals, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs
- No evidence that the productivity of target populations, including population subcomponents, is declining as a consequence of harvest levels
- No evidence that ecological productivity is declining as a consequence of harvest levels
- Application of precautionary approach

80 Scoring Guidepost
- Catch levels and/or catch arrangements are regularly set in a manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are regularly set in a manner that considers ecological productivity goals, such as, but not limited to, protection of biodiversity, predator-prey dynamics, prey abundance and spatial distribution, food web requirements, and habitat needs

60 Scoring Guidepost
- Catch levels are set in a manner that is indistinctly or unreliably related to impacts of harvest on target species or the ecosystem
- Catch levels are not appropriately adjusted in a timely manner to respond to information indicating that harvest is having unacceptable adverse impacts on target species or the ecosystem

SCORE 70

Comment: the rationale for the score is clear.

Indicator 4.1.2. Restricts gear and practices to avoid catch of non-target species, minimize mortality of this catch, and reduce unproductive use of non-target species that cannot be released alive *[Relates to MSC Criterion 3.12]*

100 Scoring Guidepost

- The management system applies an established, widely accepted program to minimize catch of non-target species, including specific goals, such that the take of these species does not exceed established thresholds where appropriate, or is precautionary.
- The management system has achieved a fishery-wide, multi-year trend of reduced catch of non-target species through restrictions in gear and fishing practices
- The management system has achieved a fishery-wide, multi-year trend of reduced discards through restrictions in gear and fishing practices
- The management system provides for productive economic or social uses of non-target species that are not released alive

80 Scoring Guidepost

- The management system applies an established, widely accepted program to minimize catch of non-target species, including specific goals, such that the take of these species does not exceed established thresholds where appropriate, or is precautionary.
- There is evidence of a fishery-wide, multi-year trend of reduced catch of non-target species
- There is evidence of a fishery-wide, multi-year trend of reduced non-productive economic or social use of non-target species

60 Scoring Guidepost

- Fishery management system demonstrates significant resistance to adoption of measures and practices to minimize catch or avoid non-productive use of non-target species

SCORE 90

Comment: the rationale for the score would be strengthened by more explicit reference to the scoring criteria. The information presented and concluding statement both suggest that the criteria for score level 100 have been met.

Indicator 4.1.3. Accounts for catch of non-target species *[Relates to MSC Criteria 3.10, 3.17]*

100 Scoring Guidepost

- The management system requires real-time, reliable monitoring of and accounting for catch and use or discard of non-target species throughout the fishery
- The management system has achieved continued improvement in the accuracy and precision of monitoring and accounting of catch and use or discard of non-target species

80 Scoring Guidepost

- The management system requires reliable, timely monitoring of and accounting for catch of non-target species and use or discard of that catch throughout all significant components of the fishery

60 Scoring Guidepost
- Information available to managers on catch of non-target species is untimely, imprecise, or inaccurate

SCORE 80

Comment: the rationale for the score would be strengthened by inclusion of specific discussion of the ways in which a 30% sample is considered to be potentially unrepresentative. It would also be helpful to present specific information on the procedural problems within the observer program that lead to potential bias in the data.

Indicator 4.1.4. Minimizes adverse impacts on habitat *[Relates to MSC Criteria 3.10, 3.13]*

100 Scoring Guidepost
- The management system requires continuing, comprehensive effort to identify, document, and assess the risks of fishery impacts on habitat
- The management system has demonstrated a pattern of actions to restrict fishery gear and practices to reduce adverse impacts on habitat
- The management system has achieved a demonstrated trend of reductions in adverse habitat impacts from fishery

80 Scoring Guidepost
- The management system requires continuing, comprehensive effort to identify, document, and assess risks of fishery impacts on habitat
- The management system has taken significant actions to restrict fishery gear and practices to reduce fishery impacts on habitat

60 Scoring Guidepost
- Fishery shows evidence of causing significant, unmitigated damage to habitat

SCORE 80

Comment: the rationale for the score is clear, but it would be strengthened by inclusion of citations documenting the problems created by the use of bottom trawl gear. How, specifically, would it effect pollock habitat, which is indicated to be the focus of the evaluation? Is the explanation presented for this indicator consistent with that presented in 4.1.5.

Indicator 4.1.5. Does not use destructive fishery practices *[Relates to MSC Criterion 3.14]*

100 Scoring Guidepost
The management system affirmatively prohibits fishery or operational practices that damage or destroy natural geologic, biologic, or chemical features or characteristics of the aquatic area in which the fishery occurs, except those impacts that are physically unavoidable consequences of authorized uses of fishing gear

80 Scoring Guidepost
The fishery does not use explosives or toxic chemicals to kill or stun aquatic species.

60 Scoring Guidepost
Fishery management system lacks reliable mechanism to determine whether participants use destructive fishery practices

SCORE 90

Comment: the rationale for the score would be strengthened by inclusion of more specific explanation as to why the team concludes that the criteria for score level 100 are not met. The text as presented suggests that they are met.

Indicator 4.1.6. Provides for rebuilding and recovery, where applicable *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost
- The management system sets and has demonstrated a trend toward achieving rebuilding and recovery goals for all over-fished stocks
- The management system does not allow fishing on any stock impacted by the fishery that has declined below limit reference points until the fishery can be demonstrated to be significantly above the limits imposed.

80 Scoring Guidepost
- The management system sets and has demonstrated a trend toward achieving rebuilding and recovery goals for all over-fished stocks

60 Scoring Guidepost
- The management system fails to reliably ascertain when stocks are over-fished, including those stocks not subject to targeted fisheries at the present time, but depressed due to earlier fishery activity
- The management system does not respond in a timely manner to information regarding the need to rebuild and recover stocks.

SCORE 75

Comment: the rationale for the score is clear.

Indicator 4.1.7. Applies closures or restrictions when catch limits reached *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost
- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent exceedance of catch limits by all participants in the fishery
- The management system has a record of identifying and eliminating factors in season that impair the effectiveness of catch limit-related closures or restrictions.

80 Scoring Guidepost
- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent exceedance of catch limits by all participants in the fishery
- The management system has a record of identifying and eliminating factors that impair the effectiveness of catch limit-related closures or restrictions.

60 Scoring Guidepost
- The management system applies closures or restrictions in a manner that repeatedly has allowed significant exceedance of catch limits

SCORE 90

Comment: The rationale for the score is clear, but the explanation would be strengthened by adding specific discussion of and citations to the recent TAC overages.

Indicator 4.1.8. Incorporates no-take zones, and MPAs, or other mechanisms, where appropriate to achieve harvest limits and ecosystem protection objectives *[Relates to MSC Criterion 3.10]*

100 Scoring Guidepost
- The management system has demonstrated a consistent ability and willingness to establish no-take zones or MPAs or other mechanisms where appropriate in order to achieve harvest limit or ecosystem protection goals
- The management system has identified criteria and standards for establishment of control mechanisms.

80 Scoring Guidepost
- The management system has established no-take zones, MPAs, or other control mechanisms, where appropriate
-

60 Scoring Guidepost

- The management system has established control mechanisms that have produced no significant benefit to target species or the ecosystem

SCORE 79

Comment: the rationale for the score is unclear. The discussion of the need to use controlled experimentation on area closures would appear to be a reason to downgrade the score from 100, rather than from 80. Further explanation of this issue is needed. The identification of the need to assess the effect of closures on SSL and other ecosystem components would also seem to address the 100 score criteria rather than the 80 score criteria. Analyzing the benefits of closures is not a criterion at any scoring level.

Indicator 4.1.9. Minimizes operational waste *[Relates to MSC Criterion 3.15]*

100 SCORING GUIDEPOST
- The management system has established rules to minimize operational waste
- The management system has established a monitoring and enforcement program for operational waste and has achieved a significant trend in reduction of such waste

80 Scoring Guidepost
- The management system has established rules to minimize operational waste, including monitoring and enforcement

60 Scoring Guidepost
- Major participants in the fishery lack internal programs or controls to minimize operational waste

SCORE 85

Comment: the rationale for the score would be strengthened by the addition of information related to why the criteria for score level 100 are not met. Is gear loss as much of a problem in the GOA as it is in the BS? Gear loss is not mentioned in the text, and the discussion sounds as if the score level 100 criteria are met.

Indicator 4.2. The management system provides for compliance *[Relates to MSC Criteria 3.11, 3.16]*

100 Scoring Guidepost
- The management system has established a comprehensive compliance and enforcement system
- The management system has demonstrated a consistent ability to enforce applicable rules, including a independently verified system for validation of reported results
- The fishery operates with no significant patterns of evasion or non-compliance

80 Scoring Guidepost
- The management system has established a comprehensive compliance and enforcement system
- There is not a record of consistent violations in the fishery
- There is a record of consistent enforcement and prosecution of violations in the fishery

60 Scoring Guidepost
- There is a record of regular violations in the fishery regardless of an existing enforcement system
- Penalties for violations of rules are insignificant in terms of deterrence value

SCORE 90

Comment: the rationale for the score is unclear because the explanatory text seems to make a strong case for meeting the criteria of the 100 score. Explanation of specific reasons why the team concludes that compliance does not meet these criteria should be provided.

Indicator 4.3. The management system provides for monitoring *[Relates to MSC Criterion 3.10, 3.11, 3.17]*

100 Scoring Guidepost
- The management system has established a comprehensive monitoring program
- The management system has demonstrated a consistent ability to monitor all relevant aspects of the fishery and employs an independently verified system for validation of reported results
- The fishery operates with no significant “blind spots”.

80 Scoring Guidepost
- The management system has established a comprehensive monitoring program
- The monitoring programs established in the fishery have been subject to outside review and comment
- The results of monitoring efforts are compiled, analyzed, and disseminated to fishery managers such that management and research efforts can be informed as to needed improvements in a timely manner

60 Scoring Guidepost
- Monitoring results are poorly integrated with harvest management actions

SCORE 85

Comment: the rationale for the score is clear.

Indicator 5.1. The management system provides for internal assessment and review *[Relates to MSC Criterion 3.3]*

100 Scoring Guidepost
- The management system has an internal, continuing, objective system for evaluation of management performance
- The criteria for and results of the on-going evaluation of management performance are made public and reflect input from all interested participants and stakeholders
- The management system shows a consistent pattern of seeking and using the results of the on-going evaluation of management performance

80 Scoring Guidepost
- The management system has a continuing, objective, open system for evaluation of management performance that includes input from interested participants and stakeholders with respect to criteria and results
- The criteria for and results of the on-going evaluation of management performance are made public.

60 Scoring Guidepost
- The management system does not have a regular program to evaluate management performance

SCORE 75

Comment: the rationale for the score is clear.

Indicator 5.2. The management system provides for external assessment and review *[Relates to MSC Criterion 3.2, 3.3]*

100 Scoring Guidepost
- The management system provides for independent, expert review of all significant aspects of management performance on a regular and continuing basis
- The criteria for evaluation of management performance are set outside the management system
- The results of the independent review are made public
- The management system shows a consistent pattern of seeking and using the results of the independent evaluation of management performance

80 Scoring Guidepost
- The management system provides for independent, expert review of all significant aspects of management performance
- The criteria for evaluation of management performance are set outside the management system
- The results of any independent review are made public

60 Scoring Guidepost
- Significant aspects of the management system are not open to outside view or evaluation

SCORE 90

Comment: the explanatory text is an interesting juxtaposition to that in the previous indicator (internal review). It would be interesting and useful to the reader for the team to discuss the relationship between the external reviews and the lack of internal reviews. Are they seen as substitutes and does the existence of external reviews obviate the need to perform internal performance reviews? The rationale for the score would be strengthened by inclusion of specific reference to the score 100 criteria and indication of why these are not met, because the text implies that they are.

Indicator 5.3. The management system includes guidelines for responding to assessment outcomes *[Relates to MSC Criteria 3.3, 3.7]*

100 Scoring Guidepost
- The management system has established comprehensive, objective standards or triggers for responding to internal and external assessments of management performance
- The management system has demonstrated a consistent pattern of responding to the results of internal and external assessments of management performance
- The management system has not demonstrated a consistent pattern of disregarding significant recommendations for improvement developed through internal or external assessments of management performance

80 Scoring Guidepost
- The management system has established objective guidelines for responding to internal and external assessments of management performance
- The management system shows evidence of improved performance based on the results of internal and external assessments of management performance

60 Scoring Guidepost
- The management system responds in an arbitrary fashion to assessments of management performance

SCORE 70

Comment: the rationale for the score is clear, but would be strengthened by inclusion of specific examples and citations of "peer shopping."

Indicator 5.4. The management system identifies research needs and directs appropriate funding and other resources *[Relates to MSC Criteria 3.3, 3.7]*

100 SCORING GUIDEPOST

- Funding for research is adequate to address all significant knowledge gaps
- Funding is adjusted in a timely and appropriate manner to serve changing research priorities
- Funding is predictable over a long-enough time scale to allow research planning appropriate to long-term research needs

80 Scoring Guidepost

- Funding for research is adequate to address major gaps in knowledge
- Funding is adjusted to meet requirements of newly identified research priorities
- Funding is predictable over long-enough time scale to allow continuity of all major stock assessment and ecological interactions research programs

60 Scoring Guidepost

- Research funding supports only sporadic investigations, allowing incomplete coverage of topics, resulting in considerable uncertainty as to the fishery and its impacts

SCORE 85

Comment: the rationale for the score is clear.

APPENDIX 5 – PEER REVIEW REPORT DR. JOHN POPE

Review of the MSC Assessment Report: The United States Gulf of Alaska Pollock Fishery.

Project Number SCS- MFCP-F_0005
Version SCS_V1_112003

By John G. Pope
NRC (Europe) Ltd.
The Old Rectory,
Burgh St Peter,
Nr Beccles Suffolk.
UK Postcode NR34 0BT.

Terms of Reference of the Review.
The peer reviewer shall comment on:

a. the overall clarity of the reports
b. Under Sections 1 through 6 and Sections 8 through 10 of the reports comment on the adequacy of the background information provided in terms of informing the reader about the fishery, the MSC assessment process, and the evaluation team's conclusions and recommendations
c. Under Section 7 of the reports, provide technical comments on whether the written text under each MSC Principle adequately describes the information reviewed, the assessment team's conclusions as drawn from the information provided, and whether the score assigned to each 'performance indicator' appears logically consistent with the written explanation and the scoring guidelines for each performance indicator.
d. Under Section 7, provide comments as necessary and appropriate on any technical inaccuracies or inadequacies based on the peer reviewer's own knowledge of the fisheries.

TOR A). The overall clarity of the reports (and some general comment)

I believe that these assessments are something of a land mark in the MSC process since I understand them to be the first on such a large fishery and on such a key component of an ecosystem. If MSC certification is to be equitably applied to all applicant fisheries then future assessments of fisheries on similarly large and key ecosystem components will need to be consistent with this for the BSAI and the GOA pollock fisheries. Thus the standards developed here are likely to be applied more widely and it is important that they are sufficiently exacting that an MSC certification holds a high reputation but not of so exalted a standard that "in this strict Court of Venice none of us would see salvation". It is also important that fisheries which are subject to strong appraisal by non-industry environmental conservation bodies are not at a disadvantage with respect to certification to fisheries where such appraisal is muted or non existent. Indeed the existence of such appraisal might itself be seen as a useful extra criterion as being likely to identify remaining fisheries and environmental issues and the BSAI pollock fishery seems very blessed in this respect.

Overall I thought this report clear (although somewhat lengthy, particularly with respect to the assessments groups comments under MSC Principle 3). It might help to bring some of the general background material out of the Principles preambles of section 7 into section 2. Sections 9 and 10 of the report serves as a summary and with a little extra work it might be adapted to provide a useful stand alone executive summary.

I very broadly agreed with Assessments Teams markings and comments. In particular I agree with the overall conclusion of the Assessment Team that the US Gulf of Alaska pollock Fishery should be certificated subject to strict adherence to the ongoing conditions specified. These seem to comprehensively address the main legitimate concerns articulated by non industry stakeholders in this fishery. Throughout the report the assessment team frequently observed that various features of the management of the pollock fishery were the best or amongst the best in the world. They also noted that the management although clearly in transition was at the forefront of applying ecosystem based fisheries management approaches. Clearly everything is not yet right but given these comments a certification seems fair in relation to other stocks and the imposed conditioned seem likely to accelerate those improvements in the management that non-industry stakeholders most wish to see adopted.

ToR B). Under Sections 1 through 6 and Sections 8 through 10 of the reports comment on the adequacy of the background information provided in terms of informing the reader about the fishery, the MSC assessment process, and the evaluation team's conclusions and recommendations

Section 1 Preamble OK no comment

Section 2, I thought this a good background to the fish, the fishery and the management system. Given the prominence of problems with Stellar sea lions and fur seal populations some brief summary and references to their distribution and interaction with the pollock fishery might be appropriate. However I note much more detail is given in the preamble to the various MSC Principles in section 7. Optionally this could be bought forward to the background section and section 7 kept as a fairly terse evaluation of the indicators. A chart showing distribution of hotspots of the pollock fisheries and mammal haul out sites might also be useful for a general reader. Subsection 2.5 seems somewhat out of place. Should it not be part of 2.3?

Section 3, this seems factual. The only comment I have is on page 17 setting Performance indicators and Guide Posts. I note that the 60 scoring level Guideposts were a later addition and at times when reading section 7 some seemed afterthoughts and the wording sometimes closer to zero (i.e. they effectively said that little useful was done) than 60 (which I took to mean not enough was done) if the range is indeed intended to span 1-100. By contrast the 100 and 80 score guideposts generally seemed reasonably set though in a few instances the wording was very close or near identical. It therefore may be that the wording of the lower guideposts needs further attention. In the main this does not jeopardize the current assessment because most scores were above or very close to the 80 level. While on this subject it is perhaps also worth mentioning that I felt near miss scores of 79 in section 7 were scored too finely. I doubt in such subjective areas its possible to score to 1% and probably all scores should be adjusted to 5% intervals. Hence most of the 79s should in my view be adjusted to 75 with a few shaded up to 80.

Section 4, Sub-section 4.1 seems a factual description of the MSC Principles and criteria and I have no comments.
Subsection 4.2. describes how these are interpreted for performance evaluation. The scheme adopted by SCC seems logical and maintains correspondence the intentions of the MSC criteria. I have no comments.
Subsection 4.3 Seems a factual description of the submission of data and (missing from the title - information).

Section 5, this is a record of assessment team meetings and interviews. This is essentially factual but fairly boring and might be banished to an appendix.

Section 6, lists environmental stakeholder concerns. This is thus an important section for focusing the likely outstanding problems in the detailed assessments of section 7. The panel appear to have done a good job of cataloguing the environment stakeholders concerns. However, I fear I have not had the opportunity to see the documents on which they were based so this is only my impression

Section 8, seems either to be redundant or if it is really a requirement it needs to be filled out a little more.

Section 9, in general I found this clear and helpful. The table linking MSc Criteria and SCS indicators was particularly useful. Setting out the scores and weightings in table 5 was helpful but it might be useful to see the overall score for each principle and to have a more detailed description of how the weightings were derived.

Section 10, I found it useful to see the conditions in one place but it would help to have the indicators spelt out so as to help see them in context. Under 10.2 I note the applicant's decision on the use of the certification and this seems wise as being likely to encourage other industry participants to help with compliance with the additional conditions.

References.
I wanted to look at two references in the Text (May et al 2003 and FAO 1994) and found neither in the reference section. A 100% failure rate on a rather small sample! Clearly there is a need for some editorial work here.

ToR C). Under Section 7 of the reports, provide technical comments on whether the written text under each MSC Principle adequately describes the information reviewed, the assessment team's conclusions as drawn from the information provided, and whether the score assigned to each 'performance indicator' appears logically consistent with the written explanation and the scoring guidelines for each performance indicator.

For brevity under this ToR "silence implies consent". I.e. where I do not comment on the information content, the assessments teams conclusions or the score it is because I agree with the team.
MSC Principle 1

Indicator 1.1.1.1

Is the formula for F_{ABC} when Stock Status $0.05<B/B_{40\%}<1$ correct? I would have thought the F multiplier would have been $F_{40\%}$ rather than $F_{35\%}$

Indicator 1.1.1.2
I note the guideposts for level 100 for this and other indicators take into account impacts on associated species. My preference would be for comment under Principle 1 to be confined to the target species and direct exploitation rates on by-catch species but not trophic interactions which can be better dealt with under Principle 2. Hence if there are no by-catch or effort linked entanglement issues I would award a higher score here.

Indicator 1.1.1.5
I agree the score and comment and endorse the need for simulation testing of this stock. This is a key condition.

Indicator 1.1.2.1
The assessment team clearly had problems with this indicator. Personally I would prefer it to refer to the limit reference point as specified by the tier rules rather than at an absolute level. Whether the tier rules (or for that matter B_{msy} based rules) are precautionary will be decided under the condition to 1.1.1.5. Similarly I would exclude predators' needs here but deal with them robustly in the appropriate place. This interpretation would lead to a passing score here. However, using the scoring guideposts as written I think the assessment team is correct to give no more than 70. Indeed the wording of 60 might suggest a still lower score but I think this might be unjust. The problem here underlines the difficulty of biomass limits with stocks subject to large natural fluctuations. The conditions specified seem reasonable.

Indicator 1.1.2.2
The differences between the 100, 80 and 60 guideposts are essentially that of confidence interval. Thus the statistical status of the current exploitation level relative to F_{MSY} should be discussed.
Indicator 1.1.2.3.1

I agree the score. Robust assessments of TAC typically need to be simple. It is of course important to have background understanding of any spatial and multispecies effects that may affect the simple model and this seems to be the case here. Such effects are typically better included in the operational model of a simulation testing of the management model as is proposed under the conditions to 1.1.1.5.

Indicator 1.1.2.3.5.2
Since this indicator is directed at catch not stock I am rather puzzled by the inclusion of fisheries independent surveys in the guideposts. Does this mean independent observer coverage of catches as opposed to fisheries independent groundfish or acoustic surveys? The score and comment are OK

MSC Principle 2

Indicator 1.1
I find it difficult to see pollock as having a similar ecological role to capelin or sandeel (sandlance). Rather I would see them in the role of juvenile cod, saithe (pollock) or bluewhiting in the Barent Sea. That is as being less oily and less favoured food for marine mammals and birds when the favoured capelin are not available. I note in the introduction to this Principle that pollock now are only the 4th ranked prey item of SSL and that sandlance are now more important. I also note that in the case of the Shetland sea birds/sandeel interaction described in the introduction that the birds and the fishery did well at the same time suggesting it is the abundance of suitable prey in the sea rather than the catch which directly affected the sea bird breeding success. Hence in this case at least fisheries affect the seabirds (if at all) through the stock recruitment relationship rather than through immediate catch and good fisheries management is presumably the key to maintaining viable SSB.

However, these are personal views and the situation as of now is that we really do not know what are the interactions between pollock, pollock fisheries and SSLs or other marine mammals. Hence, a precautionary approach is indicated and the score is appropriate. I suspect technical measures (closed areas) might be more appropriate than changes in pollock ABCs but the main aim of the condition should be to ensure to the extent possible adequate prey fields of suitable prey for SSL etc.

SL1.2

Indicator 1.2.1
I agree the comment. As in the BSAI review I see little possibility of marking on a finer scale than steps of 5 so I would mark this 75.
Under the conditions I was puzzled as to why enhanced local food supply to scavenging sea birds would have an adverse effect unless these birds have adverse effects on other sea birds. I would have thought it worth while to have a 4th condition to use the fishery to set up a series of well designed coherent experimental fished and un-fished zones in the SSLCH so as to test the effects of fishing through time on the success of different rookeries. However, I note that this is required elsewhere in the assessment.

Indicator 1.2.2
I note that lost gear is mentioned in the guidepost but not the comment. If I understand correctly that little is known of this factor then the score might come down a little.

Indicator 1.2.3
Would think a score of 75 more realistic and compatible with the lack of focus noted in the research.

Indicator 1.3.1
Is the population of sandlance adequately monitored? Typically these are a difficult group to monitor. Where no fishery exists then stomach contents of predators are often one of the best measures of their abundance since they are seldom caught effectively in trawls. A mention of the status of monitoring of this key species would be appropriate and if there is a lack of knowledge this would be a reason to reduce the score a little.

Indicator 1.3.2
Need corals be mentioned in the context of this mostly mid-water trawl fishery?

Indicator 1.3.3
I read this as an "existence of knowledge indicator. I agree that lack of sufficient knowledge makes the score and condition realistic but I cannot see that RPAs and ABCs being unsuccessful necessarily reflect on the quality of the advice. The score guide posts are a little ambiguous here. The 100 level seems to require only that management decisions could be made on the basis of the knowledge while the second bullet of the 80 score guidelines seems to imply that where appropriate management decisions should be precautionary. Of course the management could be inadequate even if the knowledge existed but I take this indicator to be concerned with knowledge not management. I think it important that the various indicators are viewed in as focused a way as possible. I note also that considerable ecosystem modelling used to be conducted in these areas by Laevastu and by Bax. I presume this hasn't been followed up in recent years.

Indicator 2.2.2
The guidepost stress management system and read rather as if they should be under MSC Principle 4. However the title of the indicator stresses scientific information and I read that into the guideposts. Given this interpretation the score is not unreasonable.

Sc 2.4

Indicator 2.4.1
The spirit of the 80 guideposts here is directed at ongoing research rather than existing knowledge and on this basis the comments suggest the mark is fair. However, I note also that the experimental approaches required under the condition of 2.3.1 indicate that not all relevant research is currently in train.

MSC Principle 3

Indicator 1.1
I agree with the panel with respect to their comments in respect to the target species. The various preambles to this Principle however indicate unclear trade offs between those fisheries and ecosystem objectives which potentially conflict. They also suggest insufficient precaution is adopted with respect to SSLs. I sense that these deficiencies are being worked out either in the courts or in compromises between different parties arranged under the shadow of litigation. Since the courts are seen as part of the management process this suggests that some at least of the 100 guidepost is in process of being attained. I also note that comment in the preamble that the North Pacific Council is a world leader in the development of ecosystem based fisheries management. The mark should certainly be more than 80 but perhaps 90 rather than 95.

SCS Criterion 2

My comments on the GSAI report also apply here. Viewing the courts as part of the management system suggests that compliance with 80 scoring guidepost bullets 1 and 3 is complete but bullet 2 is not met because component institutional entities have been found in violation (much of the comment concerns this one issue). By the same consideration (Defn. of management system) the first bullet of the 60 scoring guidelines must surely be well exceeded. Therefore I regard the score of 62 as being too low and suggest a score of 70.

As an additional condition it might be worth suggesting that NMFS senior management takes urgent steps to align the attitudes of its divisions towards a unified approach to compliance with NEPA.

SCS Criterion 3

Indicator 3.1
Again the accepted definition of "management system" gives me some problems with the comment and the mark. From the comments there are clearly deficiencies in components of the system but the inclusion of the courts in the definition of the management system seems to me to mean that the 80 score guide posts are meet by the management system in its entirety. I assume (perhaps wrongly) that the US courts are open, tolerant, stable, predictable, objective, listening etc.
I thought the comment rather lengthy for this indicator. However, I thought the condition useful which might argue for the just fail mark given which for once I might accept rather than down grading it to 75 or pushing it to 80. Perhaps what is needed to resolve this is "component bodies" being specifically mentioned in the 80 score guide post bullets. A score of 75 would then be appropriate.

SCS Criterion 4
4.1.3

The comment sounds more like a 75 score than an 80. An appropriate condition would be a higher or better randomised sampling of vessels of 60-125 ft and some sampling of the smaller vessels.

SCS Criterion 5
No comments

Tor D). Under Section 7, provide comments as necessary and appropriate on any technical inaccuracies or inadequacies based on the peer reviewer's own knowledge of the fisheries.

I have made minor comments under ToR C. Major issues which do not seem to have come fully to the fore in the report are:-

Pollock Fisheries Management.
I note that Indicator 1.1.1.3.5.3 mentions selectivity but I did not notice any mention of optimal selectivity. I also note that Indicator 3.1.1 considers genetic and age structure but again with little discussion of what is desirable. This leads me to wonder if there are any significant age or condition maternal (or even paternal) effects in spawning pollock that might make the raw SSB a poor measure of spawning potential? Does longevity and age structure have significance for the survival/resilience of the pollock stock during those regime shifts which do not favour pollock? This leads to questions of the appropriate size harvest strategy. I have a fear, that while the current regime seems to do a good job while the pollock are recruiting well, like many other schemes it might fall over if the going got rough. I would suspect this would be particularly likely if the species bet hedgeing strategies are disrupted. I am old enough to remember Canadian scientists telling me that their East coast groundfish fisheries (managed under $F_{0.1}$) were the best managed in the World. I have just got back from advising on Newfoundland cod:_ enough said!

General Ecosystem Management.
The objectives of ecosystem management are still developing and the pollock fishery will have to accept that traded offs will have to be found between fisheries objectives and ecosystem objectives. The need for well informed trade-offs to be developed is indicated by a number of the conditions set by the evaluation team. Most of the ecosystem requirements (particularly those raised by the NGOs) seem to regard Mammal and bird interactions with the Pollock as being due to lack of sufficient pollock for food. However, pollock are now only 4th in the list of prey in the GoA. How are the SSLs doing in areas where they have abundant alternative prey such as sandlance? In regions like the Barents Sea and Iceland it is the small pelagics eg capelin that tend to be the key component in the diet of birds and mammals and their loss which causes crashes of icon species. Such small oily fish species are the ones which could well be diminished by a dominant pollock stock as in the BSAI. It would seem that a fairly comprehensive Multispecies modelling approach is needed which can at least explore such tertiary effects. At one stage such modelling was well advance in the Bering Sea area and needs to be revived but in a modern context. Such models provide background to the management though they are rarely predictive enough to provide specific advice on TACs (However note that Barents Sea capelin quotas take account of the food requirement of cod). They may also provide a number of possible scenarios for management models to be tested against.

Other ecosystem management questions that might usefully be explored are how much of the pollock distribution is in the SSLCH? Do SSL preferentially forage around trawlers? Such behaviour is reported for pinnepeds from other areas.

APPENDIX 6 – PUBLIC COMMENTS ON DRAFT REPORT

MSC Comments were provided to the assessment team on 27 October 2003. The MSC has chosen to have its comments remain confidential, so they are not appended to this document. For a copy of the comments made to the assessment team, inquiries should be directed to the MSC offices:

MSC Seattle Contact	**–**	**Jim Humphreys and Kate Troll (206-691-0188)**
MSC London Office	**-**	**Chris Grieve (44-207-350-4000)**
MSC Australia Office	**-**	**Duncan Leadbitter (61-29-524-8400).**

WORLD WILDLIFE FUND COMMENTS ON DRAFT BSAI REPORT

D R A F T 26 October 2003

Chet Chaffee
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608

Dear Chet:

Thank you for the opportunity to participate in the public comment phase of the MSC assessment of the Bering Sea and Aleutian Islands pollock fishery. The draft report produced by the assessment team was a thorough and in-depth synthesis of the many complex issues incorporated in the operation and management of this fishery. The draft assessment does document just how much better managed this fishery is compared to most other fisheries. However, because the fishery and its potential ecological effects are so large, it does need to be held to a very rigorous standard.

We were gratified by the frequency with which the team examined issues that WWF highlighted in its original comments, particularly areas of concern we flagged that have resulted in proposed conditions on the fishery. It is the content and operation of the conditions about which we have further comments on the process.

Although the number of conditions the evaluation team wishes to place on the fishery indicates a commitment to holding the fishery to a rigorous standard, it does raise the question of whether a fishery with so many conditions meets the standards of the MSC? It is possible that the relatively high number of conditions under Principle 2 reflects the lack of ecosystem considerations in the Magnuson-Stevens Act, and that the fewer number under Principle 3 reflects the fact that many of the management problems lie within the government's purview to correct, rather than the applicant's.

That being said, we have the following comments about the conditions in general, and on specific conditions.

In General

We are impressed by the number of conditions the evaluation team wishes to place on the fishery and believe it demonstrates the potential power of MSC certification to drive improvements. We also applaud the incorporation of conditions that will meet and incorporate existing court rulings and hold the fishery to compliance with decisions and deadlines.

We have not been as impressed by the strength of each of the conditions. We have become increasingly concerned that the conditions emphasize studies and plans but include no trigger for more restrictive management actions if the studies and plans do not materialize, or if they do materialize, are effectively ignored. There may be uncertainty and risk in the fishery that no amount of studies or plans can remove. If that's the case, then the management regime should adjust to be more precautionary.

In many cases, the conditions require the applicant to submit a proposed study design. We are concerned that the conditions often do not specify what qualifications will be brought to bear, who the study team will be, how design, progress, and results will be reviewed, or what terms will guide the certifier in determining whether the response was adequate. Perhaps these are details that will be worked out later with the applicant, but it is not sufficient, in our view, for the conversation about study design to be solely between the applicant and the certifier.

We think it is important to enable stakeholders to participate in shaping these designs, which are where the terms of the conditions become real, where the rubber meets the road. As long as it is an open process, people can weigh in, consult their own scientific experts, and make comments, leaving it up to the certifier to decide whether the design will address the questions and the conditions. Further, we urge the team to consider incorporating timelines and deliverables in conditions so that progress can be measured and good faith compliance demonstrated.

Following are additional, specific suggestions for particular conditions. We support the inclusion of all the conditions, and have noted particular places where we have additional comments.

Principle 1

Numerous conditions on indicators under this principle have to do with uncertainty and the exploitation rate of the Aleutian Islands stock should it decline. The evaluation team felt further precaution was necessary in the control rule for this stock even though no fishery has occurred on the Aleutian Islands component since 1998. If a proposed “rider” to the Commerce, Justice, State appropriations bill passes the U.S. Congress, re-opening this depleted segment of the pollock population to fishing, we do not believe the fishery can pass muster under Principle 1. WWF relied in its comments on a continued policy of no removals from this stock, and we are not confident that even if the precautionary exploitation rate strategy and control rule proposals in the conditions were to be met that it would be sufficient protection. The existence of the so-called “Stevens Rider” provides further evidence of the concerns we expressed in our comments under Principle 3, and which we will elaborate below.

Principle 2

The evaluation team picked up our recommendation that the team producing the Ecosystem Chapter of the SAFE report for the pollock fisheries consider introducing the use of scenario planning in development management strategies that are robust under several possible futures. We are pleased the team saw merit in this approach and have some additional suggestions to offer in this regard. Scenario planning, decision analysis and risk analysis are all tactics that have not been used widely in fishery management, but have been employed in business, human health problem assessment, and the military. We recognize that these tools are probably not readily available to the applicant or among the skill sets of fishery managers. A worthwhile text on scenario planning is *The Art of the Long View*, by Peter Schwartz. More important, though, than trying to bring the typical set of players up to speed on new techniques is to use the conditions of this assessment to push the applicant and fishery managers to bring in outside expertise and engage experts from non-fishery fields who can think in unconventional ways and challenge assumptions.

For example, in another condition under this Principle, relating to Indicator 1.2.1, the team calls for improved habitat impact assessment. It will be important in doing the written reviews of the state of knowledge NOT to engage experts of the applicant or fishery managers. The condition should require the applicant to reach into other disciplines such as wildlife biology, forest ecology or conservation biology to bring fresh perspectives and an ability to think outside the conventional fishery management box. It is the narrow view that puts fishery yields above all other considerations that has caused problems for NMFS managers in the past in their inability to encompass fishery effects on Stellers sea lions and other protected species. The competing hypotheses, for example, have brought out polar opposites in scientific views, but have not fostered the healthy tension that comes of rigorous scientific debate that engages people in conflicts about ideas. To the degree that the conditions can specify how reports such as the ones in this condition be prepared by outside experts, they will contribute to understanding of the effects of the fishery rather than become justifications for it.

In the research called for in the condition under Indicator 1.2.3, we want to see, to the extent possible, that the experiments be designed to collect information on fur seal impacts as well as sea lion impacts. Experimental design also must not be so timid that it fails to test at the extremes. For example, protection areas have prevented testing some hypotheses about foraging behavior or the effects of fishing activity. Design of experiments must allow not only for testing what happens when no fishing occurs, but also what happens when it does occur. This notion further emphasizes the need to bring in experts in wildlife biology and marine mammal behavior outside the usual cast of characters. Many of the studies that are cited in the assessment provide a possible pool of scientists who can help the applicant design experiments that will answer the relevant questions. These comments also apply to the condition under Indicator 2.3.1.

We appreciate the fact that the team picked up our suggestion on bycatch reporting and believe that reporting data by species, vessel type, and so forth will contribute not only to understanding of the impacts of the pollock fishery, but to the efforts to use more ecosystem-based approaches to managing fisheries overall.

We support the team's request for external peer review of satellite telemetry data by the Center of Independent Experts, and suggest that to the degree possible, CIE might be brought in to review experimental design and reports produced under several of the other conditions set out under both Principle1 and Principle 2.

We support the call for an ongoing beach-cleaning program in the Pribilof Islands and direct the team and the applicant to several studies and pilot programs conducted jointly by NOAA, EPA and the Center for Marine Conservation in the 1990s to develop protocols for beach cleaning, data collection, and reporting on sources, fates and effects. Most of this literature is available either through The Ocean Conservancy (formerly Center for Marine Conservation), EPA or the U.S. Marine Mammal Commission.

Principle 3

We applaud the strong language in the condition set out under Indicator 2.2 and urge the team to consider benchmarks or deadlines that will provide confidence in compliance.

The evaluation called for in the condition under Indicator 3.1 is urgent. Even though "external" reviews of NMFS practice have been conducted, there is little evidence of institutional change. As noted in comments about study design under Principle 2, the "candid" review must be by experts outside the usual cast of characters; certainly outside the Council, NOAA and Commerce hierarchy.

The team did not require a condition to improve incorporation of viewpoints during council deliberations. Recognizing that council composition and appointment process is set in law, and that there are mechanisms for stakeholder input, nevertheless we feel the shortcomings and problems outlined in this section of the report are fundamental to the decision-making process. We direct the team to recommendations set out in *Fishing Grounds* (Heinz Center 2000) for improving the council process. These include training council members and stakeholders and improving participation in a variety of ways from understanding the rules, to using scientific information, to enhancing appreciation of the role of stewardship. Such recommendations may not be appropriate as conditions for the applicant to fulfill, but additional exhortations to the council and the agency would not be remiss.

We applaud the condition under Indicator 5.1 for periodic evaluation. Again, we recommend to the team the views and resources for evaluation of fishery performance set out in *Fishing Grounds.*

<u>Pacific Seafood Processors Assoc. Comments on Draft BSAI Report</u>

December 22, 2003

Dr. Chet Chaffee, Project Manager
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608,

Dear Dr. Chaffee:

The Pacific Seafood Processors Association (PSPA) and United Catcher Boats (UCB) provide the following comments on the "MSC Assessment Report: The United States Gulf of Alaska Pollock Fishery – DRAFT FOR PUBLIC COMMENT" (Project Number: SCS-MFCP-F-0005 Version: SCS_V1_111403) and the "MSC Assessment Report: The United States Bering Sea and Aleutian Islands Pollock Fishery – DRAFT FOR PUBLIC COMMENT" (Project Number: SCS-MFCP-F-0005 Version: SCS_V3_09).

We have gone through these reports and spent considerable time making substantive comments. We have found the documents to be wanting. We have serious reservations about the process that resulted in the documents and hope that the final documents reflect a more realistic and balanced approach.

Review of MSC BSAI & GOA Pollock Fishery Certification Reports

The Marine Stewardship Council (MSC) reports are structured to independently address the three prevailing principles of the organization. Each principle is broken into a suite of criteria and indicators with conditions associated with specific indicators. It is further structured in a hierarchical fashion to avoid unnecessary redundancies. Nevertheless, there is overlap among the conditions.

The governing principles of the Marine Stewardship Council are:

> MSC PRINCIPLE 1: A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.
>
> MSC PRINCIPLE 2: Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

> MSC PRINCIPLE 3: The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Conditional certification implies that there are specific conditions the applicant must meet to secure rights to utilize the MSC logo for marketing purposes. These conditions are agreed to through a formal contract between the At-Sea Processors Association (APA) and MSC.

General Comments

The MSC review takes care to heap praise on the NPFMC and NMFS for their successes in management of the BSAI & the GOA pollock fisheries, e.g.:

> *"The biology, ecology and dynamics of walleye pollock have been the subject of intensive research over almost three decades. The science (much of it undertaken by staff at the Alaska Fisheries Science Center) is in general world class. This is one of the best studied fish in the world, and much is known of its life history and dynamics."* p 42. BSAI, p 40 GOA

> *"The quantitative assessment undertaken for EBS (GOA) pollock is also world class. There is proper treatment of both observation and process uncertainty (statistical uncertainty), and the sensitivity of the assessment to a range of uncertainties (data selection and weighting, values of assumed parameters) is routinely undertaken."* p 43 BSAI, p 40 GOA

> *"The fishery resource is subject to intensive scrutiny by leading scientists employing state-of-the-art tools and techniques. Research funding is at an all-time high. The management system is infused with skilled resource managers and legal advisors and managed pursuant to a remarkably open and inclusive process that, in fact, stands well ahead of nominally identical processes elsewhere in the United States and other decision-making systems around the world."* p 122. BSAI, p 118 GOA

Yet there are glaring deficiencies that Scientific Certification Systems (SCS) demands be corrected before certification of these fisheries as compliant with the principles of the Marine Stewardship Council.

Many of the conditions stipulated by the SCS demand attention to aspects of fisheries management judged wanting by the conservation industry, but regarded as either addressed or under continuing study by fisheries scientists and managers. Whereas the conservation industry representatives have failed in large part to present a scientifically convincing case for a number of their expressed concerns to the NPFMC and NMFS family, it appears they have found a more receptive audience in the select SCS. No where is this more on display than in the requirements for MSC Principle 3, Indicator3.1 which demands "*affirmative steps to ensure that information and opinions* [of the conservation industry] …*are given fair, professional, and transparent evaluation at all levels of the management system*." The obvious interpretation of this demand is that the SCS accepts the conservation industry's assertion that the treatment of such information and opinions has not been fair, professional and transparent. In our view, nothing could be further from the truth.

SCS failed to establish a distinction between the At-Sea Processors and fishery managers. At-Sea Processors are not the managers of these fisheries. APA's ability to affect change in the management system is limited to making recommendations to the appropriate management authority. In short, the MSC / SCS process requires that a contractual obligation be taken on by a party (APA in this case) with no authority to fulfill the obligation. It is unreasonable to expect any non-governmental applicant to assume contractual responsibility for elements beyond their direct control. In this context all conditions mandating a change beyond the direct control of APA must be amended so that the burden on APA is one of soliciting change or working toward change. Of the 25 conditions for the BSAI and the 23 conditions for the GOA there are only a handful that could be dealt with by contracting outside experts to do the work, these include: MSC P1 conditions 1.1.1.5 (with the exception of modifying the harvest control rules), task 1 of condition 1.1.2.1 (GOA), 1.1.2.3.1, and 1.2.3.5.1; MSC P2 conditions 1.2.1 (with the possible exception of implementing the research program), and 1.2.3 (however the scope of this research is much too large to expect a private foundation to fund the task, and critical permits to interact with endangered species are required from NMFS).

Overall there is a theme emanating from the conditions that 1) management must exercise additional precaution in setting ABCs for EBS, AI, and GOA pollock fisheries, i.e., scale the ABCs downward; 2) too little research is being done to understand ecosystems, the fishery impacts on ecosystem components and ecosystem impacts on the fishery, and 3) that the pollock fishery is guilty until proven innocent of causing the declines in Steller sea lions and fur seals. In our view this is hyperbole.

Specific Comments
Principle 1

<u>Principle 1, Indicator 1.1.1.3 (BSAI only, No conditions for Indicator 1.1.1.3 in the GOA)</u>

- *Improve the assessment for the AI stock so that it meets at least tier 3 information requirements, and also implement zero ABCs at stock sizes below $B_{20\%}$, (as for EBS and GOA stocks); or*
- *Formalize a revised harvest control rule, applicable at level 5 information requirements that will protect the stock at low stock sizes at least as well as the current strategies for EBS and GOA stocks.*

The 2004 SAFE document includes Appendix D containing a analysis of a statistical age-structured model of the Aleutian Island pollock populations. While the NPFMC's BSAI Groundfish Plan Team and the SSC did not adopt the assessment as the tool for setting 2004 AI pollock ABC, this assessment does begin the task of moving the stock toward a tier 3 ABC process. We would expect continued work on the AI pollock model and anticipate its reappearance in the 2005 assessment cycle.

With respect to the harvest control rule effect on fishing mortality at stock biomass levels below $B_{20\%}$ it should first be pointed out that the AI age-structured assessment estimates that 2004 biomass was 124% above the estimated $B_{40\%}$ target for spawning biomass. Be that as it may, the modified harvest control rule developed during the SSL Biological Opinion process established a zero ABC for the pollock fisheries at $B_{20\%}$. (2001 Biological Opinion, Table 5.4 p 153).

Given that the 2004 AI pollock ABC continues to be based on the tier 5 processes, the short term actions possible for affecting the harvest control rule at low stock sizes are limited. There is no means to estimate the $B_{40\%}$ reference point in these circumstances, hence no way for objective appraisal of the degree to which the stock is above or below target spawning biomass thresholds. Ad hoc devices would have to be employed to further scale the allowable catch based on trawl survey biomass. Setting ABC scalars based on current to long-term survey biomass might be one device for adjustment of AI tier 5 ABCs but it is hard to imagine how such an action would lessen the uncertainty in ABC determination. The tier 5 estimate of available biomass is already an average over the past three bottom trawl surveys.

The MSC review rationalizes concern for the conservation of the AI pollock stock in part by referencing a high estimate of the exploitation rate in 1998:

> *"However just prior to the closure of the AI stock to targeted fishing in 1998, the exploitation rate had risen rapidly and was apparently well above* F_{MSY} " p 47

The 2004 model estimated that full selection fishing mortality peaked in 1995 at 0.61 compared with the $F_{40\%}$ estimate of 0.66. The MSC review also notes that the score for this indicator represents a balance across the two management zones:

> *"The combined score reflects the balance of performance across the two management zones for this indicator. The BSAI fails to meet the standard for this indicator because the tier 5 harvest control law currently applied to the AI stock does not reduce exploitation rate as stock levels decline".* P49

We do not understand the definition of balance in this context. The AI stock represents 3% of the combined EBS and AI stock biomass, and a fishery with a zero TAC for the last 4 years. Therefore, we ask the question in what context are the MSC concerns balanced?

In our view, given the progress being made to move AI pollock into the tier 3 ABC process this condition is unnecessary.

Principle 1, Indicator 1.1.1.5 (applies to BSAI and GOA)

SCS requires that formal evaluation and testing of the robustness of current and any proposed new harvest strategies used to manage EBS and AI pollock be undertaken, using methods similar to those recommended by Goodman et al. (2002). The SCS evaluation team requires that any plans to correct this deficiency lay out a step-wise plan with timelines such that at least three stages of work would be available for evaluation:

- *Prepare detailed specifications for the evaluation.*
- *Undertake the evaluations.*
- *Modify harvest strategies as appropriate from the results of the evaluations*.

In conversations with Dr. Ianelli, NMFS/AFSC author of the EBS stock assessment, the evaluations undertaken for the Programmatic Supplemental Environmental Impact Statement (PSEIS) largely address this concern for both the BSAI and the GOA. Although it is conceivable that an independent contractor could be found to conduct this analysis, it is more likely that APA would encourage the analysis to be conducted by NMFS staff that are intimate with the fishery, data systems and assessment models. A new effort to undertake this task would take additional months of analytical time, and deprive analysts from making progress on other more pressing needs. The cost of an independent analysis could easily reach $100,000 and would require substantial interaction between the analyst and NMFS staff. If the MSC is unsatisfied that the analysis found in the PSEIS meets the terms of this condition, then **they must amend the condition to require APA to encourage an analysis rather than conduct it.** Under any circumstances, **APA could not meet the stipulation under bullet 3.** At best they could recommend changes to the harvest strategies after an independent analysis were fully vetted through NMFS scientists and the NPFMC's SSC.

More generally, Indicator 1.1.1.5 references determining whether the harvest strategy is precautionary. SCS seems to answer that question by acknowledging a precautionary approach to harvest strategies, but lamenting that those processes are not more precautionary. The SCS concerns may reach beyond the intent of the indicator.

Principle 1, Indicator 1.1.2.1: (GOA only)

4. *The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation.*
5. *The GOA plan team and the SSC should review and comment on the additional evidence presented to the SCS evaluation team by Martin Dorn (Appendix 3 and other unpublished data).*
6. *The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour.*

Dr. Martin Dorn, NMFS/AFSC, has already undertaken work to meet item 1. With respect to item 2, the Plan Team and SSC were presented with these findings during the 2004 assessment review (November minutes of GOA Plan Team p 4-6 and Walleye Pollock section of the introduction to the 2004 GOA SAFE). Regarding item 3, NMFS has expanded the

Winter EIT survey to include areas of the GOA other than Shelikof Strait and plans to continue this effort for the near term. An Additional NMFS GOA wide EIT survey was initiated in the summer of 2003 with the agency planning to continue the survey biennially.

Principle 1, Indicator 1.1.2.3.1 (BSAI only)
SCS requires that the fishery complete one of the two alternatives below:

- *Undertake an appropriate quantitative assessment for the AI stock, as required for indicator 1.1.1.3.*
- *Demonstrate clearly that tier 5 assessment is sufficiently precautionary to meet requirements for indicators 1.1.2.1 (Current stock sizes are assessed to be above appropriate limit reference points) and 1.1.2.2 (Current exploitation rates are below appropriate limit reference points). The demonstration would be achieved by meeting the conditions under indicator 1.1.1.5.*

We believe bullet one of this condition is satisfied with the development of the 2004 AI statistical age-structure model. The **bullet two condition is mute** once the AI pollock stock is moved to tier 3. The Plan Team's recommendation to maintain a 2004 AI pollock ABC based on tier 5 processes was provoked in part because they had limited time to review and comment on the newly developed age structured model. The model is fully developed, which is not to say that it won't be further explored, and ABC recommendations for future years are likely to rely on the model.

Principle 1, Indicator 1.1.2.3.3 (BSAI only)
SCS requires that the author of the SAFE report for EBS/AI evaluate the sensitivity of the assessment to the impacts of Russian catches on the EBS stock, and present the specific results with a thorough explanation in all future SAFE reports following certification.

Model 3 of the 2004 EBS pollock stock assessment evaluates the effects of including the catch of pollock from the Russian zone. Model results are presented in Tables 1.11 through 1.13 pp 70-72 of the report. The predominate effect of these catches was to increase the estimates of overall population size and estimated yield. The NPFMC continues to recommend ABCs based on a model restricting catch data to the U.S. fishery (Model 1)

Principle 2

.Principle 2, Indicator 1.1 (BSAI and GOA)
...the fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries. The plan must show how the authors of the 'Ecosystem Considerations' chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures.

The desire to integrate ecosystem concerns into an institutionalized adjustment of the ABC is understandable but naïve. The academic development of tools to meet this criteria is simply not present. No one knows how to do what is being asked, not even those responsible for compiling the ecosystem considerations in the first place. It is possible to integrate some elements of the ecosystem concerns. For example, past modeling efforts have attempted to integrate the EBS circulation model with the age-structured model as a device to explain a portion of the variability in pollock recruitment. In the GOA, the stock assessment author uses five FOCI data sets (3 physical indicators and 2 biological indicators) to scale predictions of the current year-class strength. Current practice for the stock assessment authors is to review the Ecosystems Chapter and comment on 1) how the ecosystem indicators may influence perceptions of stock abundance and yield and 2) how the fishery affects ecosystem components. For the 2004 EBS stock assessment the author presents Table 1.19 p 79 describing ecosystem considerations.

The principle concern expressed in the discussion leading up to condition 1.1 appears to be the notion that pollock ABCs are not sufficiently considerate of predator needs.

> *Efforts to avoid possible local depletion in areas of particular importance for foraging marine mammals (fur seals and Steller sea lions in particular) have been of uncertain efficacy, and it appears have done rather little to reduce the very high proportion of pollock catch taken from defined 'critical habitat' of Steller sea lions. Given the potential influence of the pollock fishery on Steller sea lion prey fields, and the fact that ongoing studies have not yet provided a firm understanding, the management appears not to be as precautionary as one might expect in a position of continued uncertainty*. P 84 BSAI, P 81 GOA
>
> *…there still appears to be significant uncertainty about the possible effects of fishing on foraging success by SSL inside and outside 'critical habitat'*. P 85 BSAI, P 82 GOA
>
> *… the current management emphasizes continues to maintain a stable high annual harvest rather than protection of the wider ecosystem.* P86 BSAI, P 83 GOA

Just how conservative do the ABCs need to be before there is acknowledgement that they are considerate of predator needs? First, the single species stock assessment model, like all such models, includes an estimate of the natural mortality of pollock. This mortality ostensibly provides for the deaths due to predation, disease and injury. Minimally, the natural mortality is expected to account for the consumption of pollock by predators. Although recent work by Hollowed et al (2000) and Dorn (2003) indicate that natural mortality of GOA pollock may have increased for some year-classes as a result of increased predation by Arrowtooth flounder. Second, the EBS single species model, as shown through its retrospective analysis, consistently underestimates current population abundance (see Table 1.17 p76, and Figure 1.32 p 110 of the 2004 SAFE). To illustrate, the 1998 stock biomass estimated at 7.4 million t in the 2000 stock assessment is estimated to be 11.1 million t in the 2004 assessment. The propensity to underestimate EBS current stock size imposes a significant reduction on the allowable ABC. Retrospective analyses for the GOA pollock reflect more mixed results than observed in the EBS but on balance retrospective bias tends to underestimate near term stock abundance (p 53 of 2004 GAO SAFE) Third, the harvest control rules adopted by the NPFMC are conservative. For EBS pollock the utilization of the harmonic mean to estimate F_{MSY},, the adjustment of allowable exploitation rates with respect to stock size, and the setting of total allowable catch below ABC are all illustrations of conservative steps incorporated in the assignment of harvest allowances. In the GOA, the standard harvest control rule has been further modified for pollock to maintain a constant buffer between ABC and OFL at all levels of spawning stock biomass. Where spawning stock biomass falls below the target $B_{40\%}$ the constant buffer harvest control rule results in an even more conservative allowable fishing mortality rate than the standard harvest control rule. Furthermore, the conservatively adjusted fishing mortality rates remain in place until stock abundance has climbed well above the target spawning biomass level.

Although the NPFMC is largely praised for development of conservative harvest control rules, they don't stop there. With the listing of the Steller sea lion as endangered, the Council adopted a significant array of protected habitats to further insulate Steller sea lions from the fishery. They have dispersed the fishery both spatially and temporally to add even more protection to avoid possible interaction with sea lions. For example, in the GOA, harvests are apportioned temporally and spatially across the GOA, with 4 area apportionments and 4 quarterly allocations. As if this is not enough, they have effectively closed all of SE Alaska to pollock fishing, eliminated pollock fishing in extended sea lion foraging areas around Bogoslof, and closed fishing in the Aleutian Islands despite a conservatively estimated ABC of nearly 40,000 t.

The empirical data show that the EBS pollock stock is at an all time high in abundance and the AI pollock stock continues to increase in abundance. Both stocks are well over their target spawning biomasses. It is therefore very difficult to accept the SCS position that the fishery management policies are not sufficiently conservative to provide for the foraging needs of marine mammal predators.

If the SCS has insight as to how one would integrate an eclectic mix of ecosystem observations into an institutionalized rule for adjusting single-species modeled estimates of total allowable harvest, they would do well to point it out. **We suggest that the SCS amend this consideration to require continued encouragement of the utilization of ecosystem considerations as presented in the SAFE Ecosystems chapter in the development of single species model ABC recommendations and rationalization.** The goal is to develop ecosystems awareness by the stock assessment scientists. Let those scientists use their own intellectual talents to modify their models and incorporate consideration for ecosystem effects.

Principle 2, Indicator 1.2.1(BSAI and GOA, except as noted in footnote 1)
…the fishery must improve assessments of impacts on habitats as follows:

1. *Provide a thorough written review of the state of knowledge of the impact of pollock fishing on SSLCH and on the relevance of the SSLCH concept, in order to focus future research onto key unknown questions. These will probably include the question of defining critical habitat for foraging Steller sea lions as opposed to critical habitat where disturbance to resting or breeding animals should be constrained.*
2. *Provide a thorough written review of gear loss from pollock fishers and its impacts on habitats, including those habitats used by fur seals[522].*
3. *Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds.*
4. *Develop and implement research programs to provide the missing information identified in 1-3 above required to identify whether the fishery has adverse effects on habitats through gear loss or through enhancing local food supply to scavenging seabirds.*

Regarding item 1 of the above condition, we are having a difficult time understanding what the SCS expects from a new review. Are you begging the question of whether or not SSLCH is correctly defined**?** The original CH definition was based on the central tendency of maximum migration distances observed in an early subset of the available telemetry data along with platform of opportunity (POP data) sighting data. There has been a great increase in the amount of telemetry data and a more intense evaluation of that data regarding the distribution patterns of Steller sea lions. **Under the ESA, the SSL Recovery Team is supposed to wrestle with this question. Given the current interpretation of telemetry data, it is appropriate that they, not the APA, revisit the existing definition of critical habitat.**

If on the other hand, your focus is actually on the impacts of the fishery on SSLCH, **we believe it would be very unlikely for anyone to find anything new to put into the record at this time.** After all, the impact of the pollock fishery on SSLCH has been the focus of repeated reviews, culminating in the 2001 Biological Opinion and the 2001 Supplement to the Biological Opinion prepared for Judge Zilly's court. Since 2001, the NOAA has dispersed more than $80 million to research both the cause of Steller sea lion declines, the effects of fishing on Steller sea lions and constraints on their population recovery. Much of this research is ongoing. The NRC has investigated the effect of the fishery on SSLCH, and a NPFMC commissioned independent review has done the same. While the prevailing hypotheses for SSL declines are leaning in the direction of top down (i.e., predator) controls rather than bottom up (food), no one can unequivocally eliminate fishing as a potential adverse impact on SSLs. Consequently, there are an extraordinary set of fishery controls to mitigate the potential for adverse fishery impacts.

The SCS admonishes the fishery management system for failing to measure the efficacy of RPA generated SSLCH protection measures. Any experiment to evaluate the efficacy of RPA protection measures would be extremely unlikely to be able to attribute a cause and effect for

[522] All references to northern fur seals apply to the BSAI only.

any change in SSL abundance associated with imposition of those measures. For one thing, SSL population change is slow, abundance indices are imprecise, both SSL and pollock are mobile, and natural variation in abundance of the prey base is high. Separating the forces of change into those due to management and those due to natural events is extremely problematic. For another thing, the RPA protection measures are precautionary; if the fishery is not a determining factor in SSL survival, RPA protection measures will have no impact on SSL recovery.

SCS also chides management for the utilization of unfiltered telemetry data to rationalize SSL protection zones. The SCS cites the Supplement to the 2001 Biological opinion, so it is aware of this document, but apparently missed the reference to the revised analysis of telemetry data found in Section II and Appendix I of that report. The revised analysis utilized telemetry data acquired from 2000 to 2002 from animals fitted with transmitters that recorded dive depth as well as other data elements. The diving data was used to screen the data for those position observations where the animal had recently been actively diving at depths greater than 4m. This was done to eliminate position fixes associated with resting or transiting behaviors. While it remained unknown whether the diving animals were actively foraging, this was the working hypothesis. The revised filtered data set used information from satellite tracking of juvenile SSLs stratified into two age groups, < 10 months and > 10 months of age. The data were further stratified into summer and winter time periods. Results corroborated the prior assessment that habitats in the 0-10 nm strata were significantly more utilized that those beyond 10 nm. There was an upward adjustment to the estimates of utilization of habitats beyond 10 nm particularly in Winter months by juvenile SSL > 10 m of age. Nevertheless, this age group still spent nearly 70% of their time within the 10 nm radius of haulouts and rookeries.

Northern fur seal entanglement rates are revised downward from the values cited by the SCS. The SCS cited a value of 0.4 whereas NOAA indicates the rate is now about 0.2:

> "*The rate of entanglement for juvenile males was calculated as 0.23% (56/24,701) on St. Paul Island and 0.21% (13/6,057) on St. George Island.*"
> Source: http://nmml.afsc.noaa.gov//AlaskaEcosystems/nfshome/entangle/NFSEntanglementStudies.htm

The incidence of entanglement debris is apparently declining and beach clean up efforts are being undertaken. Nevertheless, NFMS indicates that additional research is needed to calibrate current protocols for investigating impacts of marine debris on Northern fur seal survival.

The request to provide a written review of the effects of pollock discarding on scavenger sea birds may be doable under contract or through encouragement of NOAA staff to undertake such a review.

With respect to providing the SCS with a research plan to address data gaps identified in bullets 1 through 3, we believe that this is much too broad a requirement to place on

APA. At best, APA may be able to compile a summary of active research on these topics. The condition should be amended accordingly.

Principle 2, Indicator 1.2.3 (BSAI and GOA, except as noted in footnote 1 p. 9)
… research must be implemented to describe:

1. *Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the regional scale related to stock size and stock geographical distribution;*
2. *Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling;*
3. *Relationships between northern fur seals and entanglement hazard.*

Much of the information related to the relationship between the pollock fishery and foraging sea lions is available in Section III of the Supplement to the 2001 Biological Opinion. The SCS is well aware that extensive research has been conducted and continues to be conducted to evaluate these concerns. **The APA with their limited resources will not be able to resolve this research question, and it is unreasonable to ask them to do so.**

Let's consider what is being sought. The effects of the fishery are assumed to be both direct and indirect. In order to determine whether any fishery has a direct adverse impact on Steller sea lion foraging you need to present some quantitative appraisal of the probability that sea lions and the fishery overlap in time and space (both geographically and bathymetrically). Moreover, you have to have a sense of perspective regarding the relative abundance of prey, the threshold prey densities required to provide successful foraging and the opportunities and costs for effective prey switching in the face of competition. Other questions that arise when seeking insight into fishery/sea lion interactions include questions of foraging behaviors and prey size preference. Do SSLs prefer to hunt aggregated or dispersed prey? If they prefer aggregated prey, how aggregated? Do sea lions show a preference for the same size distribution of prey consumed by the fishery? Do the fishery and sea lions hunt during the same time of day?

We are gaining on the question of where SSLs forage and at what depths; we are also gaining on the issue of the preferred size distribution of their prey. We have yet to ascertain the survival costs to Steller sea lions of a missed meal. In the mean time, we observe that the pollock biomass is more than twice the size it was when the sea lion population peaked, with the reduction in sea lion abundance and increase in pollock, the relative density of the global BSAI pollock prey base is nearly an order of magnitude greater than it was 20 years ago. Recognizing the overwhelming abundance of pollock as an available prey source, and the enormous logistical difficulties of making empirical observations of sea lion predatory behaviors and preferences, and given the legal constraints on interacting with endangered species, we believe it is unlikely that one could answer the conditions stipulated by SCS.

Among the conditional requirements is a demand to address the "putative fish school disruption in localized areas caused by trawling." To what end is this required? One can not simply measure the effect of a fishery on pollock population density and assume that a reduced density demonstrates an adverse impact on other predators for all the reasons mentioned above.

Acknowledging the extensive research done to date to address these questions, and the governmental resources directed at the task, **it is simply unreasonable to require a non-governmental fishing association to uphold this condition.**

Principle 2, Indicator 1.3.3 (BSAI and GOA, except as noted in footnote 1 p.9)
…the fishery must establish a research panel and write reports examining if there are significant issues of concern related to:

- *The influence of the pollock fisheries on jellyfish blooms;*
- *Increases of Arrowtooth flounder and other predators that may be infilling the 'large pollock' niche;*
- *The effect of pollock fishing on northern fur seals.*
- *(Concerns regarding the relationship between the pollock fisheries and SSL are dealt with under Indicator 2.3.1)*

Once again, the SCS seeks additional reports on the status or effect of the pollock fishery on other species. The NMFS is already generating reports that address these questions. Evaluation of fishery impacts on northern fur seals will be undertaken in a new EIS for the fur seal subsistence harvest. The trends in jellyfish catches in the Bering Sea bottom trawl survey are reported on page 183 of the 2004 SAFE Ecosystem Chapter. Catch rates have fallen after peaking in 2000 and are currently at levels observed in the 1980s and 1990s. Over the past 10 years there is no apparent relationship between the relative abundance of gelatinous zooplankton and the pollock fishery. The annual SAFE reports address the trend in BSAI Arrowtooth flounder biomass, which peaked in 1994 and has been declining since then. Unlike the Gulf of Alaska where the Arrowtooth flounder biomass is three times that of the pollock biomass and a likely contributor to annual variability in pollock year-class survival, in the Bering Sea the pollock population is an order of magnitude larger than that of the Gulf and the Arrowtooth flounder population is about a quarter of the size of the Gulf population. The opportunity for significant interaction is substantially reduced given the population dynamics of the Bering Sea.

In the GOA where the interaction appears greatest, NFMS scientists seem to be well aware of the population dynamics implications of interactions between pollock and Arrowtooth flounder. There are very limited opportunities to control Arrowtooth abundance. It is a low value fishery that is constrained in it prosecution for economic reasons and because of the higher incidence of catches of prohibited species. Rationalization of the GOA groundfish fishery could have a positive impact on PSC catch making it possible to increase target fisheries on Arrowtooth.

We believe it is unreasonable to require APA to establish a research panel to evaluate the highlighted interactions. **Amending the condition to report on research progress in these areas would be more suitable.**

Principle 2, Indicator 2.1(BSAI and GOA)

To improve the deficiencies in performance for this indicator, the fishery must:

1. *Adjust management as described in the Conditions under Indicator 1.1.*
2. *Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.*

The requirement to "adjust management" was discussed above under General Comments. Briefly, **APA can not be required to adjust management**. They are in a position only to work toward a change in management by making suggestions to the management authority as required. **Language in this condition should be amended accordingly**.

Comments on Condition 1.1 are reported above. Regarding improved published reports on bycatch, demand for catch reporting at the haul level is intrusive. Data at this level of detail are available to authorized government scientists and under some conditions to their contractors. Analyses requiring a haul by haul level of precision can be conducted by these scientists. **There is no benefit to the public interest by demanding finer scale reporting than that currently available**.

Principle 2, Indicator 2.2.1 (BSAI and GOA, except as noted in footnotes 1 and 2)

…the fishery must adjust management to be more precautionary where impacts on Steller sea lions and northern fur seals cannot be ruled out.[523]

1. *The analysis of the satellite telemetry data used to justify the 2001 BiOp should be subject to external peer review and the results of such review shall be available to the certifier within 6 months of a final determination for the BS/AI fishery. NMFS should submit the telemetry data analysis to the Center of Independent Experts (CIE). The University of Miami's CIE administers a review process, drawing from a formal pool of qualified scientific experts, ensuring the selection of a panel free from the influence of either NMFS or other groups with a vested interest in the review's findings. It is very important that the panel should contain 2 or members with expertise in the analysis of PTT data from marine vertebrates.*
2. *The management system should consider the input received from the CIE review and act appropriately.*
3. *Consistent with the condition established under Indicator 1.2.1, Indicator 1.2.3 and Indicator 3.1, pertaining to research on the effects, if any, of lost pollock fishing gear and other debris from vessels on northern fur seals, the team directs that until the fishery can demonstrate that the pollock fishery is not a cause of entanglement mortality, or is an insignificant cause of fur seal entanglement mortality, the fishery must:*
    - *Take actions to evaluate the amount of fishing gear lost from fishing vessels during the fishing season,*
    - *Determine the amount of fishing gear, if any, causing entanglement of fur seals, and*

[523] This phase of the condition pertains to the BSAI pollock fishery only.

- *Take actions appropriate to mitigate potential entanglement problems from lost pollock fishing gear until such time as there is evidence showing that pollock fishing gear is not a direct cause of the fur seal entanglement problem (see footnote 1 p. 9).*

These issues have largely been dealt with above. Minimally, **the condition has to be amended to ask APA to work toward changes in the management system if required.** With respect to telemetry data, Dr. DeMaster (NMFS/AFSC Director), reports that NMFS has commissioned a CIE review of telemetry data and this review is scheduled for February 2004. Regarding potential impacts of pollock fishery gear on northern fur seals, the SCS is requiring the fishery to take precautionary steps unless they can prove no interaction. That sets the bar at an unreasonably high level since it is seldom possible to rule out a potential effect unequivocally. It may be possible to improve data gathering on gear loss and/or to implement plans to effectively dispose of scrap web and packing bands. **The SCS should amend the condition to require provision of reports to document steps taken in the pollock fishery to mitigate the effects of lost gear.**

<u>Principle 2, Indicator 2.3.1(BSAI and GOA)</u>
...the fishery must design and carry out experiment(s) to test the suggested impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in 'experimental' and 'control' areas on SSL behavior, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002) also recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. Therefore we set this condition requiring the fishery to carry out the experimental study recommended by the NRC report.

On its face this is a preposterous demand to put on the APA. NMFS has conducted or is currently conducting at least three experiments to test this question. These include: the Barnabus and Chiniak Gully EIT pre and post fishing surveys, the Unimak Pacific cod pot surveys and the Aleutian Island Atka Mackerel tagging surveys. Each of these projects is attempting to measure fishing induced local depletion. None of these experiments is able to simultaneously measure sea lion predation rates. Nor can any of these experiments generate estimates of the effect of fishing induced changes in prey abundance on sea lion survival. The original RPA committee, and the subsequent Steller sea lion Mitigation Committee both wrestled with how to implement the adaptive research program suggested in the NRC report. The NPFMC SSC, as reported above, suggested that it would be impossible to separate the cause and effect as a consequence of any imposed Steller sea lion protection measure. Despite the daunting impediments to achieving this goal, the NPFMC is going to gather a "Blue Ribbon Panel" of experts to make one more try at developing an experimental design to meet this challenge. **The SCS should delete this condition.**

<u>Principle 2, Indicator 3.1(BSAI only)</u>
…the fishery must implement a program for assessing the link between the declines in fur seals and pollock fishing, including reduction in fur seal entanglement in the EBS. To accomplish this requirement, several steps are required:

1. *Implement an ongoing beach-cleaning program in the Pribilof Islands and any other location where fishing gear is known to cause extensive entanglements. The clean-up program will also be used to identify the amounts of different types of debris that are collected, and the likely origins of the fishing related debris. This will permit a better assessment of the extent to which fishery and non-fishery sources contribute to this problem, and which fisheries are responsible. The clean-up should continue on a regular basis if it is found that pollock fishery waste is a major component of the waste, but this condition should be lifted if it is found that the waste contains little derived from the pollock fishery.*
2. *The fishery will develop and implement a program for improved monitoring and data collection regarding gear loss and at-sea wastes from individual pollock fishers, and a plan for reducing gear loss and other at-sea wastes.*

If the study of waste and fur seal entanglement shows that the pollock fishery is a major contributor to this problem, then entanglement rates of fur seals and other marine mammals must be monitored using statistically valid strategies to analyze the effect of entanglement on populations of affected species.

These issues are addressed under Conditions 1.3.3 and 2.2.1. There is an obvious view held by SCS that the pollock fishery is a significant contributor to declines in fur seal populations. While we believe this is not the case, we suggest that this condition be amended to do no **more than report on efforts to constrain gear loss in the fishery.**

Principle 3

Principle 3, Indicator 2.2 (BSAI and GOA)
…the fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy.

Under no circumstances can the applicant guarantee compliance with this condition. The APA is not the fishery manager.

Principle 3, Indicator 3.1 (BSAI and GOA)
…the fishery must take affirmative steps to ensure that information and opinions submitted by stakeholders who do not represent the interests of the commercial fishing industry are given fair, professional, and transparent evaluation at all levels of the management system. The evaluation team requires that the management system commission an independent evaluation of the manner in which non-industry stakeholder information and opinions have been addressed in a representative set of circumstances identified by stakeholder interests. The evaluation should identify opportunities for procedural and substantive improvements, including measures to provide greater transparency and accountability to the process.

Of all the conditions proposed by the MSC, this is the most egregious. The implications are insulting. Every Council meeting is an open meeting, every subcommittee meeting is an open meeting. The Council and NMFS have deliberate public notification procedures to invite stakeholder participation at multiple levels in the decision making process. At no time have the non-fishery stakeholders been constrained in delivery of either their verbal or written testimony to the NPFMC.

The scientific findings of non-industry participants are vetted through the NPFMC's SSC. This body is a mix of agency and academic scientists with absolutely no stake in the outcomes of their evaluations. Non-industry stakeholders have equal access to federal and state agency scientists to assist them in the acquisition and interpretation of fishery data. The point of view expressed by non-industry stakeholders is evaluated in the same manner as that provided by industry stakeholders: on the merit of the arguments and the scientific findings presented to support those arguments.

The voice of non-industry representatives has been heard, and their point of view has been professionally and fairly evaluated by the advisory committees and the Council. Moreover, the non-fishery stakeholders have made a difference in the manner in which the fishery is managed.

Despite SCS opinion to the contrary, **there is no need to order an independent evaluation of the manner in which non-industry opinions are addressed in this management system. Nor can we imagine how to construct a more deliberative, open, and transparent decision making process.** All that the non-industry representative has to do to be treated fairly and professionally is show up and testify.

Summary

Clearly, the MSC has gone to great lengths to evaluate and compile the perspectives of those parties interested in the proper management of Bering Sea, Aleutian Island, and Gulf of Alaska pollock fisheries. Their review has been comprehensive and it is obvious that they attempted to become very knowledgeable of a highly complex and controversial fishery. That said, the deficiencies identified as conditions for final certification are typically misapplied to the petitioner and or unnecessary because the condition is already or about to be met.

Additionally, the use of "Indicators" is confusing. For example, on Principle 1, Indicator 1.1.1.5 states **"**The harvest strategy can be shown to be precautionary." To comport with the conditions that follow the indicator should be changed to "The harvest strategy can be made more precautionary." Alternatively, the levels of precaution that are inherent in the existing strategy should be outlined. Likewise on Principle 3, Indicator 3.1 states, "The management system solicits and takes account of relevant information." Again, there is a disconnect between the indicator and the condition. In the case that you were to rewrite the indicator to say "The management system solicits and renders decisions more in line with non-industry stakeholder concerns", the condition as written may be responsive. The use of the term "relevant" in the indicator seems to be forgotten in the drafting of your condition.

We appreciate the opportunity to comment on the MSC certification and we hope that our recommendations are taken seriously.

Sincerely,

Glenn Reed
President
Pacific Seafood Processors Assn.

Brent Paine
Executive Director
United Catcher Boats

Cc: MS

National Marine Fisheries Service Comments on BSAI Draft Report

30 November 2003

Memorandum to: Bering Sea/Aleutian Islands Pollock Fishery Assessment Team

From: Jim Balsiger, Regional Administrator, Alaska Regional Office
Doug DeMaster, Science and Research Director, Alaska Regional Office

Subject: Comments on the Draft MSC Assessment Team Report on the Bering Sea/Aleutian Islands Pollock Fishery

Our staffs have carefully reviewed the draft MSC Assessment Team Report on the Bering Sea/Aleutian Islands Pollock fishery. We understand and appreciate the considerable effort of the Assessment Team in developing this draft report. Nonetheless, we are concerned that the report was apparently developed without the benefit of the June 2003 Supplement to the October 2001 Biological Opinion. We believe that the supplement contributes important information regarding the evaluation of the potential impacts of the BSAI (and GOA) groundfish fishery on the western population of Steller sea lion. Therefore, we have provided specific quotations from the supplement, which we believe are pertinent regarding your ability to adequately evaluate the potential impacts of the BSAI Pollock fishery on the marine environment.

In addition, we are concerned that the Assessment Team appears to be unaware of some of the most recent information from the SAFE Reports (December 2002) and the Alaska Marine Mammal Stock Assessment Reports (December 2002). Therefore, we have also provided specific references to the Assessment Team regarding this information.

Finally, while NOAA Fisheries has no direct affiliation with the certification process sought by the At-Sea-Processors Association, we believe it might be helpful for the Assessment Team to have a short overview of the research conducted by the AFSC in fiscal year 2003. It is difficult predict what the FY04 appropriation from Congress will include, but it would not be unreasonable to expect level funding or a slight reduction in funding in FY04. Therefore, a short summary of the FY03 Alaska Fisheries Science Center research plan is reported in Appendix 1. Please note that funding for several of the research projects included in the draft report (e.g., additional observer coverage, entanglement studies on northern fur seals and seabirds, and ecological studies on gelatinous zooplankton) are unlikely to be appropriated by Congress in 2004 or in the near future.

I. Conclusions from the Supplement to the 2001 Biological Opinion

In an effort to insure that the MSC Assessment Team is aware of the conclusions reached by NOAA Fisheries regarding the potential impacts of the BSAI (and GOA) groundfish fishery on Steller sea lion populations in Alaska, we offer the following quotations from the Supplement to the Endangered Species Act – Section 7 Consultation Biological Opinion and Incidental Take Statement of October 2001 (June 2003: pp 57-58).

"The analyses in the preceding sections of this biological opinion forms the basis for conclusions as to whether the proposed action, the ongoing fisheries for Pacific cod, Atka mackerel, and Pollock in the BSAI and GOA as modified by amendments 61/61 and 70/70 satisfy the standards of the ESA Section 7(a)(2)."

"The supplement further explores the rationale of the 2001 Biop, the telemetry information and the performance of the fisheries in relation to the requirement in order to remove jeopardy and adverse modification found in the FMP Biop. On the basis of this information and the analysis (2001 Biop and the supplemement), NOAA Fisheries draws its conclusions about the effects of the pollock, Pacific cod, and Atka mackerel fisheries on the survival and recovery of the two listed populations of Steller sea lions."

"In this section NOAA Fisheries must determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed action, the environmental baseline, and cumulative effects. The information available to NOAA Fisheries is both quantitative and qualitative. For Steller sea lions, although significant research has been funded over the past few years and new information is being developed on the habitat requirements of the species, as well as various reviews (e.g., Bowen et al., 2001; NRC 2003) the cause of the current decline of the species is still unknown. NOAA Fisheries expects that over the next 3-5 years a significant amount of new information will be available for future decision making, however, much of the available data today is based on the professional judgment of knowledgeable scientists."

"After reviewing the current status of the endangered western population of Steller sea lions, the environmental baseline for the action area, the proposed action for Alaska Groundfish in the Bering Sea and Aleutian Islands and Gulf of Alaska, and the cumulative effects, it …. is not likely to jeopardize the continued existence of the western population of Steller sea lions."

II. Steller sea lion telemetry data

The MSC Assessment Team calls for rigorous peer review of the telemetry data analysis given the significant role of the telemetry data in setting the regulatory regime. However, the Assessment Team in reaching this conclusion was unfortunately not able to benefit from the information reported in the supplement to the 2001 Biological Opinion. We direct Assessment Team members to pages 15 to 19 of the supplement. In this section NOAA Fisheries summarizes the best available data regarding juvenile foraging behavior. This assessment is based exclusively on surface locations associated with diving for 63 juvenile Steller sea lions in western Alaska. The raw data are presented in Appendix I of the supplement. The age distribution of the animals from which satellite telemetry data were collected was: 30 animals 11-12 months of age, 10 animals 13-18 months of age, 9 animals 19-24 months of age, and 5 animals 2-3 years of age. The new "dive filtered" analysis shows the young of the year Steller sea lions spend about 90% of their time diving within 10 nm of a rookery or haulout site. For juveniles >10 months of age and less than 2 years of age, they also use nearshore areas heavily, about 87% within 0-10 nm in the summer, but only 67.9% in the winter. NOAA Fisheries believes that these "dive filtered" data currently represent the best available scientific data regarding the foraging behavior of Steller sea lions, as only surface positions associated with diving behavior (assumed to be associated with foraging behavior) are used in the analysis. Therefore, the telemetry information presented in the 2000 Biological Opinion and the 2001 Biological Opinion should not longer be considered reliable in the evaluation of the foraging behavior of Steller sea lions. The following statement from the supplement is critical to the evaluation of the telemetry data (p. 20):

"Given the relatively low number of locations in the 10-20 nm zone (Talbe II-6), and the fact that there are about one third the number of locations in 10-20 nm for the animals of most concern … , and the greater reliance on this zone by the older juveniles in the winter (Table II-7), NOAA Fisheries rates the 10-20 nm zone as a "low to moderate" concern (Table II-9)."

III. Competition with commercial fisheries

Further, NOAA Fisheries in the supplement provides an evaluation of the degree to which the BSAI (and GOA) groundfish fisheries overlap competitively for "prey" (see pages 21 – 30. NOAA Fisheries' determination that the BSAI (and GOA) groundfish fisheries do not jeopardize the continued existence of the western stock of Steller sea lion is based on the conclusions reported therein.

Finally, the supplement provides a summary of the experiments on fishery effects on prey availability for Steller sea lions (see pages 30 – 32). We note that the Assessment Team states as a condition of a satisfactory score under indicator 2.3.1 that the "fishery must design and carry out experiment(s) to test the suggested impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in "experimental" and "control" areas on SSL behavior, breeding and population trends. NOAA Fisheries contends that the three experiments described in this section of the supplement address the recommendations of the report by the NRC (2003). If additional information on the status of this research would be of help the Assessment Team in its evaluation, NOAA Fisheries staff would be glad to provide additional material.

IV. Northern fur seal entanglement in marine debris

The MSC Assessment Team has noted in their report the following:

"Fowler (2002) estimated that about 15% per year of the Pribilof northern fur seals died in marine debris at the observed entanglement rate of 0.4% per survey of harvestable sized subadult males. At the entanglement rate reported, a population that would otherwise be expected to be stable in numbers would be expected to exhibit a decline of about 7-8% per year (Fowler, 2002), a model-projected figure that is rather close to the observed rate of decline. Therefore, it appears that entanglement caused mortality cannot be ruled out as a continuing contributing factor to potential fur seal declines."

The Fowler 2002 paper was intended *inter alia* to update the available data reported in the Fowler (1987) report in the Marine Pollution Bulletin. However, due to significant changes in the way data on marine debris at the Pribilofs are currently collected relative to the data reported in Fowler (1987), Fowler was not able to use data collected after 1992. One of us (dpd) has discussed this issue with Fowler recently. Fowler believes considerable additional research is needed to calibrate the current protocol used for investigating the impact of marine debris on northern fur seals with the data he has previously reported on. Therefore, at present the best available scientific advice is based on the expert opinion of NMFS and is reflected in the 2002 Marine Mammal Stock Assessment Report for Alaska (Angliss and Lodge 2002). The following quote is from this report:

"Mortality resulting from entanglement in marine debris has been implicated as a contributing factor in the decline observed in the northern fur seal population on the Pribilof Islands during the 1970s and early 1980s...Surveys conducted from 1995 to 1997 on St. Paul Island indicate a rate of entanglement among subadult males comparable to the 0.2% rate observed from 1988 to 1992...which is lower than the rate of entanglement (0.4%) observed during the 1976-85..."

V. Interactions between the BSAI pollock fishery and jellyfish

The MSC Assessment Team may not have seen or may not have had time to review the chapter of the most recent SAFE report regarding ecological indices. One of the indices reported therein has to do with gelatinous zooplankton (e.g., jellyfish). As noted in the SAFE report, the jellyfish biomass index is currently at levels typical of the Bering Sea, having peaked several years prior. AFSC staff will continue to report the results of studies on gelatinous zooplankton ancillary to our primary bottom trawl surveys to assess the status of commercially important groundfish. However, it is important to note that over the past 10 years there is no apparent relationship between the BSAI pollock fishery and the relative abundance of gelatinous zooplankton in the Bering Sea.

VI. Summary Statement

As noted above, NOAA Fisheries has no affiliation or association with the efforts by the At-Sea-Processors Association regarding the MSC label for the BSAI pollock fishery. By no means should this memorandum be construed as NOAA Fisheries engaging in a critique of the MSC Assessment Team's evaluation. Rather, the information provided in this memo is an effort on the behalf of NOAA Fisheries to clarify any misunderstandings or misinterpretations of the available data, as well as an effort to make the Assessment Team aware of the best available scientific information and the likely types of research projects that NOAA Fisheries will be able to undertake in the Bering Sea (and Gulf of Alaska) in FY04.

If you have any questions regarding any of these comments, please contact us at your earliest convenience.

Attachement: appendix 1

Appendix 1. List of titles of research projects conducted by the Alaska Fisheries Science Center in fiscal year 2003 that were relevant to research recommendations proposed by the Marine Stewardship Council's Assessment Team for the BSAI Pollock Fishery. The titles of projects were extracted from the Center's Annual Operating Plan for FY03. A complete set of all AFSC milestones and additional information on specific projects (e.g., milestone description, status, report narrative) is available by contacting the AFSC Center Director's Office (7600 Sand Point Way, NE, Seattle, WA, 98115).

0301-07	Allocate and manage MILLER FREEMAN ship time for FY 2003
0301-09	Charter vessels for biennial survey effort
0301-10	Provide sampling equipment and supplies for resource surveys
0301-12	Support of the design and construction of the new NOAA ship OSCAR DYSON
0301-14	NMFS survey trawling calibration workshop
0301-15	FY 2003 Cooperative Research Program
0302-07	Development of opening/closing AWT Trawl
0302-	Report on the Characteristics of

10	Trawls and Frequency of Use of Excluders used in Alaska trawl fisheries
0302-11	Halibut excluders for Pacific cod trawl fisheries
0302-12	Winter EIT survey of Alaska Pollock in Bogoslof Island area
0302-13	Winter EIT surveys of Pollock in Shumagin Islands, Shelikof Strait and other locations in the Gulf of Alaska
0302-14	Summer EIT survey of the Gulf of Alaska
0302-15	Kodiak Steller sea lion/Pollock fishery interactions study
0302-16	Retrospective analysis of EBS and Bogoslof winter EIT survey data
0302-	Completion of manuscript comparing

17	US and Norwegian acoustic assessments of gadids
0302-18	Preparation of manuscript summarizing work describing potential fish reactions to an acoustic survey vessel
0302-19	Cooperative work with TINRO to summarize results of post-1995 EIT surveys in the western Bering Sea
0302-21	Research to reduce salmon bycatch
0302-22	Effects of fishing on Essential Fish Habitat
0303-08	Temporal changes in abundance of non-commercial fish and invertebrates in the eastern Bering Sea
0303-09	2003 Biennial Gulf of Alaska groundfish bottom trawl survey

0303-10	Annual Eastern Bering Sea groundfish and crab bottom trawl survey
0303-11	Selectivity of the EBS survey trawl for red king crab
0303-12	Age and size at maturity of flathead sole near Kodiak Island
0303-13	Taxonomic study of dusky rockfish
0303-14	Age and size at maturity of Dover sole near Kodiak Island
0303-15	Post tagging recovery of Pacific cod
0303-16	Effects of chronic bottom trawling on the size structure of soft-bottom benthic invertebrates
0303-	Data reports and industry reports from

17	2002 bottom trawl surveys
0304-09	Compare FOCI and GLOBEC field work in cooperation with PMEL
0304-10	Forecast 2003 year-class strength of Gulf of Alaska walleye pollock
0304-11	Atlas of abundance and distribution of patterns of ichthyoplankton from the NE Pacific Ocean and Bering Sea ecosystems based on research conducted by the AFSC (1972-1996)
0304-12	Begin development of a prototype ichthyoplankton information system
0304-13	Publish four major new articles on the Bering Sea
0304-14	Begin development of molecular markers for species identification of Steller sea lion prey

0304-15	Continue analysis of western Gulf of Alaska data and present initial results at the 27th Annual Larval Fish Conference (August 2003)
0304-16	Apply 3-dimensional coupled biophysical model of oceanography and lower trophic levels of the Gulf of Alaska ecosystem to produce hindcasts of ecosystem status for use in understanding recruitment of pink salmon
0304-17	Re-code established pollock individual-based model to investigate potential causes of Steller sea lion population decline
0304-18	Complete 2-D foraging model for Steller sea lion individual-based model
0304-	Initiate development of data sets to

19	permit ecological forecasting of walleye Pollock recruitment
0304-20	Initiate development of data sets to establish the feasibility of using ecosystem metrics to characterize the status of the North Pacific ecosystem and detect climate change signals
0304-21	Recover zooplankton displacement volume data for use in the development of an ichthyoplankton metric
0304-22	Complete synthesis of pollock recruitment as a complete process
0305-06	Complete experiments on the effects of air, temperature, and fish size capture stress and mortality in sablefish bycatch discards
0305-07	Complete experiments on ontongeny of chemosensory behavior in juvenile

	sablefish, Pacific halibut, and walleye Pollock
0305-08	Conduct studies on essential fish habitat and the role of biogenic and bed-form structures on the predation mortality and habitat preference of juvenile Alaska flatfishes
0305-09	Continue studies on the functional ecology of visual foraging by juvenile walleye pollock and sablefish, incorporating consideration of turbidity effects
0305-10	Conduct experiments on the effects of environmental conditions on growth and energy allocation in juvenile fishes
0305-11	Conduct experiments on the effects of temperature on predator-prey interactions

0305-12	Complete experiments on the effects of light and temperature on responsiveness to bait in Pacific halibut and sablefish
0307-11	Study of the parasitological fauna of Steller sea lions
0307-12	Examination of the role and effects of disease in aquatic populations
0307-13	Analysis of Atka mackerel tumors
0307-14	Gulf of Alaska ecosystem- small mesh trawl survey monitoring
0401-05	Provide technical assistance on stock assessment for groundfish environmental impact statements
0402-01	Train and deploy observers

0402-02	Provide safety and sampling equipment to observers and develop and implement an electronic inventory system
0402-03	Debrief observers and evaluate their performance
0402-04	Review data, update and maintain database and develop enhanced data system functions
0402-05	Provide regulatory and management support to Region and NPFMC
0403-01	Provide age structure information for EBS groundfish resources
0403-02	Provide age structure information for GOA groundfish resources
0404-01	Assess the status of BSAI and GOA fishery resources through stock

	assessments and population dynamics research to improve the scientific basis for policy decisions
0404-02	Provide technical assistance on stock assessments for Environmental Impact Statements
0404-03	Collect and analyze data to determine factors influencing the reproductive potential of Pacific cod, and walleye Pollock
0404-04	Complete analysis of the spatial distribution and assemblage structure of rockfish in the BSAI. Evaluate the distribution of rockfish survey and fishery data in relation to major topographic and physical factors
0404-05	Complete analysis of rockfish density measurements using different survey methodologies

0404-06	Conduct a juvenile flatfish survey in the frontal regions of the eastern Bering Sea shelf
0404-07	Conduct cooperative RACE/REFM field experiments to determine the impact of fishing on sea lion prey abundance and distribution on the eastside of Kodiak Island. Complete analysis of third year of this four year experiment.
0404-08	Synthesize data on proximate composition of Steller sea lion prey from collections made in 2001 and 2002 in the Gulf of Alaska, Aleutian Islands and Bering Sea. Submit paper to scientific journal for peer review
0404-09	Conduct inter-ship calibration to evaluate the efficacy of using acoustic data loggers for mapping Pollock

	distributions in the Eastern Bering Sea
0404-10	Prepare a report on the evaluation of the efficacy of Steller sea lion no-trawl zones in Sequam Pass and Tanaga Pass
0404-11	Prepare a report describing results of feasibility studies to design experiments to measure the potential impacts of a cod fishery on the availability of prey for foraging sea lions (implement in FY04)
0405-01	Continue improvements in North Pacific groundfish stomach collection and laboratory analysis
0405-02	Update Bering Sea Multi-Species VPA
0405-03	ECOPATH/ECOSIM modeling (of Bering Sea ecosystem)

0405-04	Provide information on groundfish trophic interactions
0406-03	Improve methods for assessing fishing capacity and capacity utilization
0406-06	Complete evaluation of regional economic models for Alaska fisheries
0406-09	Develop preliminary design and procedures for the Steller sea lion, non-market valuation survey
0406-10	Provide technical economic assistance for Environmental Impact Statements, Regulatory Impact Review, Regulatory Flexibility Act Analysis, and the Agency's or Council's issue-specific work groups
0406-11	Provide technical sociocultural assistance for Environmental Impact Statements, Social Impact

	Assessments, and Agency's or Council's issue-specific work groups
0406-12	Complete in-depth community profiles of Dutch Harbor/Unalaska and Chignik based on fieldwork conducted in FY02
0501-02	Publish Marine Mammal Stock Assessment Reports for 2002
0501-04	Convene Alaska Scientific Review Group meetings
0501-07	Develop plan to better integrate oceanography and marine mammal research
0502-01	Estimate abundance, pup production, and survival of the western stock of Steller sea lion
0502-02	Determine Steller sea lion pup conditions

0502-03	(Conduct studies on) Interactions of Steller sea lion (SSL) foraging and fishing in relation to Critical Habitat of SSL
0502-04	Update the PVA for the western stock of Steller sea lion
0502-05	Determine current trend of northern fur seals (using pup surveys at Pribilof Islands)
0502-06	Use fish bones to estimate length of prey consumed by Steller sea lions
0502-07	Determine the trophic position of Steller sea lions using stable isotopes
0503-01	Refine a state-wide population estimate for harbor seals in Alaska
0503-04	Analyze aerial photogrammetry for estimating harbor seal abundance

0503-05	Initiate long-term studies of harbor seal vital rates
0504-02	Estimate trends in abundance of beluga whales in Cook Inlet
0504-03	Report on distribution of large cetaceans relative to their habitat in the Bering Sea
0504-04	Develop revised abundance estimates for cetaceans in Alaska
0504-05	Update the North Pacific humpback whale photo-ID catalog
0504-06	Estimate the abundance of the central North Pacific humpback whale stock
0504-07	(Estimate) Killer whale abundance/distribution from the Gulf of Alaska to the Bering Sea: field work and report

0504-08	Publish manuscript describing predation behavior of transient killer whales in SE Alaska
0504-10	(Conduct) Harbor porpoise aerial surveys (in Alaska over 3-4 years)
0505-02	Determine vital rates for Steller sea lions at Rogue and St. George Reef
0505-04	Conduct a photo-identification survey of gray whales in WA
0505-05	Estimate killer whale historical population size using museum specimens
0506-01	Review literature and synthesize single species/ecosystem management principles
0506-02	Report on the incidental take of seabirds in AK commercial fisheries

	(based on observer data and fisheries data)
0602-05	(Submit) NMFS Alaska coded wire tag report to Pacific States Marine Fisheries Commission
0602-06	Submit NPAFC documents on SECM research cruises and related studies
0602-07	Annual report on NEP-GOA-GLOBEC coho salmon research
0603-01	(Conduct) Genetic stock identification of Pacific salmon
0603-02	(Conduct) Satellite radio telemetry for salmon migrations
0604-01	(Conduct) Gulf of Alaska salmon surveys
0604-02	(Conduct) Eastern Bering Sea juvenile salmon surveys

0604-03	(Conduct studies on) Salmon growth and survival monitoring
0604-04	(Conduct) Retrospective studies of Alaska climate and fish populations
0604-05	(Conduct) High seas salmon research
0605-01	(Conduct) Annual GOA and BSAI longline survey
0605-02	Assess sablefish and GOA rockfish stock status
0605-03	Determine relationship between Steller sea lions and their prey availability and quality
0605-04	Assess the effect of bottom trawling off Alaska on fish habitat
0605-	Describe deepwater corals

05	
0605-06	Describe Aleutian corals and other deepwater living substrate
0606-01	Identify non-point sources of pollution threats to habitat quality in Alaska
0606-03	(Identify) PAH inputs into Port Valdez
0606-04	(Evaluate) Steller sea lion diet and (associated) contamination problems
0606-05	Assess the seasonal habitat function of near-shore marine areas, including wetlands, eel-grass, and kelp in SE Alaska

At Sea Processors Association Comments on Draft BSAI Report

November 21, 2003

MEMORANDUM

TO: BERING SEA/ALEUTIAN ISLANDS ASSESSMENT TEAM

FROM: AT-SEA PROCESSORS ASSOCIATION

RE: COMMENT ON THE DRAFT MSC ASSESSMENT REPORT ON THE BERING SEA/ALEUTIAN ISLANDS POLLOCK FISHERY

The At-sea Processors Association (APA) provides the following comments on the draft report on the Bering Sea/Aleutian Islands pollock assessment submitted to the Marine Stewardship Council (MSC) on September 26, 2003. The assessment team is to be commended for producing a thorough and comprehensive report on the fishery. This report sets the standard for draft assessment reports conducted under the MSC program. The quality and balance of the report reflects the team's extensive consultation with stakeholders as well as the willingness of NOAA Fisheries and the North Pacific Fishery Management Council to provide information and analyses necessary for the team to conduct its work.

We offer the following specific comments to the assessment team on the draft and ask that you consider our suggestions in drafting the final report. Our comments are limited to factual issues and practicalities relating to certain indicators and conditions.

Principle One

Principle 1, Indicator 1.1.1.5

There appears to be a contradiction in the condition for Indicator 1.1.1.5. The certification body states that it "does not seek to prescribe precisely how (meeting the condition) should be done," but the balance of the section directs the management authority to undertake specific tasks for evaluating and testing the robustness of the current harvest strategy as well as any new strategies. It is helpful for the certification body to reference the recent Goodman et al (2002) report as a resource, but we suggest that the overly prescriptive language of the condition be struck and that the management authority be provided maximum flexibility to achieve the desired result.

We further recommend deleting the requirement for the management authority to submit "detailed specifications and proposal for work" to the SCS evaluation team for approval. The management authority is not the applicant and has no obligation to cooperate in this exercise. Furthermore, the management authority is subject to statutory and other regulatory mandates that prioritize its use of time, personnel and money. It is, therefore, possible that NMFS and or the North Pacific Council will decide that other issues command a higher priority for their limited resources than responding to a request by the applicant for changes in the way the pollock fishery is managed. This is especially true where, as in the case of the North Pacific, the management authorities are devoting substantial time and resources to rationalizing the remaining open access fisheries (e.g. Gulf of Alaska groundfish and BS/AI crab); and to other issues such as bycatch reduction and the protection of essential fish habitat that are subject to statutorily-imposed deadlines. Nevertheless, APA will encourage the management authority to achieve the desired result of the condition; that is our obligation, and we take it seriously. The management authority might choose to consult with the certification body, if indeed the management authority sees fit to fulfill the requirements of the condition. However, APA believes that what is paramount is that the fishery achieves the desired result. Maximum flexibility should be afforded to the fishery managers to achieve the requirements of the condition.

Principle Two

Principle 2, Indicator 1.1

As APA's original submission indicated, the Bering Sea/Aleutian Islands pollock fishery incorporates numerous ecosystem-based elements into the management system. In addition to employing a precautionary approach in the ABC and TAC setting processes, there is a comprehensive federal fishery observer program, an innovative rationalization system to limit effort and reduce fishery impacts, and extensive use of Marine Protected Areas (MPAs) to avoid fishery impacts on marine mammals. Alaska pollock fishery managers have implemented numerous other progressive ecosystem-based management measures identified by the National Academy of Sciences.

It is, however, unclear that the management authority can achieve the condition set forth under Indicator 1.1, which requires incorporation of data from the Ecosystem Chapter in the annual SAFE document into the ABC setting process. We have consulted with NOAA Fisheries managers and scientists who indicate that fisheries science is still developing methodologies for introducing environmental parameters into fisheries models and that the state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator.

Perhaps we are reading too much into the condition, which calls for a "plan" on how ecosystem recommendations will be used in setting limits on ABCs. We read the condition to require the management authority to move immediately to incorporate current recommendations into a quantitative model as opposed to the qualitative approach now being employed. If that is not the assessment team's intent, then some clarification of the condition would be useful. Likewise, if the assessment team can direct APA to a similar fishery in which ecosystem data have been successfully incorporated into stock assessment and other models, such examples that might assist us in working with the management authority to further improve the fishery's adaptation of an ecosystem-based management approach.

Principle 2, Indicator 1.2.1

Indicator 1.2.1 assesses how the management system identifies and estimates impacts of the BS/AI pollock fishery on habitats. The draft notes that many aspects of the assessment "meet or exceed the 80 scoring guidepost," but the team expresses concern about the state of knowledge of the impact of pollock fishing on Steller sea lion (SSL) critical habitat.

Specifically, the evaluation team criticized NOAA Fisheries for using "unfiltered" telemetry data in preparing its analysis of what management measures, if any, were needed to avoid potential impacts of fishing on SSL populations. In fact, NOAA Fisheries did use "filtered" telemetry data in the 2001 Biological Opinion as well as in the Supplemental Analysis that the agency submitted to the Court on 19 June 2003 (the "Supplement"). The filtering technique utilized in the Supplement, however, was more refined than that utilized in the 2001 BiOp.

In the 2001 BiOp, the agency attempted to eliminate potential bias in the telemetry data by simply eliminating "90% of the locations which occurred between 0 and 2 nm from shore." This technique was designed as a precautionary method to minimize the possibility of overestimating "the dependence of juveniles and adult females on the inner 10 nm of critical habitat." The Supplement used a different and somewhat more refined approach—one that was based on a new telemetry analysis that "integrat[ed] dive depth with locations". According to the Supplement, "[t]he new dive-related telemetry data identifies more specifically the mechanism that sea lions use to forage (i.e., diving)." (Supplement, p. 14).

In sum, the evaluation team's concern about "unfiltered telemetry data" providing the basis for management actions appears to be unfounded. We request that the team review the relevant documents, including the Supplement, and reassess the score. The precautionary "filtering" techniques utilized in those documents, especially the approach utilized in the Supplement analysis provided to Judge Zilly, should provide a compelling case for a score of 80 or above.

We also challenge the premise of the scoring rationale criticizing NOAA Fisheries' approach by asserting that satellite transmitters "have almost all been placed on SSL pups." Satellite transmitters were placed on lactating females and juveniles—the two segments of the population whose missing members were considered potentially responsible for the decline of SSL populations according to a life table analysis prepared by York in 1994. While lactating females are accompanied closely on the beach by a pup, the tags are not placed on the pup. When a lactating female is in the water foraging, the pup is still on the beach. Some tags were placed on Young of the Year (YOY), which are part of the juvenile population segment, but which are older than pups and are weaned, thus their foraging activities are independent of adult females.

The supplement reports on analyses completed in January and February 2003 "based on juvenile dive locations derived from satellite transmitters during the three-year period from 2000-2002." Pages 15-19 of the Supplement provide information derived from satellite dive recorders for 63 juvenile Steller sea lions. Of note, the analysis indicates that, "In summer, juvenile sea lions predominately use the 0-10 nm zone of critical habitat (88.9%)…In the winter the pattern is similar with 90.3% inside 0-10 nm, and 7% in 10-20 n.m." (See p. 18 of

Supplement.) We request that the assessment team review this new information and consider modifying its draft conditions accordingly.

After considering this information, if the assessment team continues to believe that a condition is warranted, we suggest that the first bullet point be redrafted to require that the certification body be provided with information on ongoing research projects to determine the impact of pollock fishing, if any, on SSL critical habitat with particular emphasis on the effects of fishing, if any, on foraging sea lions. We are concerned that, as drafted, the condition requires an exhaustive, but duplicative, report of published research findings from the extensive, ongoing SSL research programs being conducted by NOAA Fisheries, private universities, federal grantees, and others.

The fourth bullet point of the condition requires the fishery "to develop and implement research programs to provide missing information" on issues ranging from possible effects of pollock fishing on SSLs, fur seals and seabirds. We believe that this condition, as drafted, is far too open-ended. As noted above, significant research is being conducted, and much information already exists relating to the identified issues of possible concern. We recommend that the condition, if needed, require that the certification body be provided a summary of the current state of knowledge on the identified issue areas of concern and that targeted, clearly defined research programs be undertaken, only if necessary, after consultation between the certification body and the fishery based on the findings of the written reviews.

Principle 2, Indicator 1.2.3

The assessment team notes the "high quality of research" on the ecology of the Bering Sea, including research "directly relevant to the position of pollock within the ecosystem." The assessment team believes, however, that there is inadequate research on the relationships between SSL foraging behavior and pollock prey abundance at the regional and local scale and requires that research be "implemented."

We believe that a closer review reveals that there is significant ongoing research in this field. We urge the condition to be redrafted to call for ongoing research to be continued and for the fishery to provide an assessment of the need for additional research. We also urge the assessment team to keep in mind that public and private sources of research funding are limited, and there are competing hypotheses to be explored as evidenced by the findings of the National Research Council that "top-down" hypotheses, such as killer whale predation, are believed to pose more of a threat to recovery of SSL populations than fishing activities. We urge that any conditions related to research reflect federal budget realities, competing research priorities both within the Alaska region as well as nationally. We also ask the team to recognize that the fishing industry is already funding independent research on critically important topics and has limited resources available for making grants for additional studies.

The conditions for both Indicator 1.2.1 and 1.2.3 call for the establishment of research programs relating to fur seal entanglements in fishing gear. (The assessment team report notes the "unanswered question" of the "extent to which the northern fur seal mortality rate is increased by entanglement.") The assessment team should be aware that there is significant ongoing research into the issue of fur seal entanglement. (See Lestenkof A.D. and Zavaldil P.A. 2002. 2001 northern fur seal entanglement monitoring report. Aleut Community of St. Paul Island, Tribal Government, Ecosystem Conservation Office. St. Paul Island, Pribilof Islands, Alaska.) The assessment team should be aware also that no evidence has been provided that the U.S. pollock fishing fleet is the source of the fishing gear, or other fishing-related material, relating to northern fur seal entanglement.

The scope of this condition should be limited only to the effects, if any, of the BS/AI pollock fishery on fur seals. While the U.S. pollock fleet shares the concerns of others, including the assessment team, about the extent of northern fur seal mortality by entanglement, within the context of this assessment we should not be tasked with addressing issues not directly related to the performance of the pollock fishing fleet.

The assessment team should consider a phased approach in which the U.S. pollock fishing fleet is provided an opportunity to review the results of ongoing research and to demonstrate that the U.S. pollock fleet is not a significant source of entanglement. A research initiative, beach clean-up, or other action should only be required based on the results of an analysis of entanglement studies to date, and include consideration of NOAA Fisheries' finding about northern fur seals that "direct human-caused mortality remains a small portion of the calculated PBR." (See Federal Register, Vol. 68, No. 166, August 27, 2003, Notice of Availability of Draft Stock Assessment Reports.) (Please note that the section of this report on northern fur seals has been updated recently, but that is not the case for all species included in the document.)

APA believes that fur seal mortality due to entanglement is not a cause of the decline of fur seal populations and that entanglement in U.S. pollock fishing gear is not a significant source of mortality. We suggest that the fishery be provided an opportunity in the annual audit phase to make its case to the certification body and that if our supposition proves incorrect, then a discussion can ensue about a desired course of action, including minimizing gear loss, conducting beach clean-ups, etc.

Principle 2, Indicator 1.3.3

This indicator introduces a task "to establish a research panel" to "write reports" on numerous issues that the team itself admits are of unknown significance. The assessment team notes correctly in numerous instances that the management agency conducts world class research and is staffed with top-flight professionals. The agency and the private sector have limited human and financial resources to meet current management challenges. It is setting the bar unreasonably high, and in disregard of the precautionary approach adopted by the Alaska pollock fishery, to score the fishery below 80 on this indicator.

Specifically, it is not at all clear that Arrowtooth flounder populations in the Bering Sea/Aleutian Islands management areas have increased significantly. We ask the team to consider whether this was intended as a Gulf of Alaska management issue. We note also that the team's lack of specificity about what "other predators" it is referring to as "infilling the 'large pollock' niche" in the BS/AI management areas suggests that this too does not rise to the level of a condition.

Finally, it seems curious that with the pollock biomass at historically high levels of abundance and TAC levels at two-thirds of the ABC limit that jellyfish blooms are replacing large pollock in the ecosystem. Indeed the most recent Ecosystem report prepared by the BS/AI plan team indicates that jellyfish biomass in the BS/AI has actually declined in each of the past three years and that the jellyfish biomass is now close to the levels seen in the 1980's and early 1990's. See Figure 1, p. 183 of the draft Ecosystem Chapter for the 2004 Groundfish Fisheries, prepared by the BS/AI Plan Team, November 2003.

Even if a condition is warranted for this indicator, and it is clearly not, language directing research reports on the "effect of pollock fishing on northern fur seals" is far too open-ended. Again, we recommend at the very least that the team not mandate establishing a research panel or producing reports under this indicator and that issues relating to northern fur seals be dealt with under other conditions.

We also request that the language of the scoring rationale be redrafted to reflect that the conflict in the literature concerning likely causes of the fur seal decline is considerably broader than issues related to pollock fishing. U.S. pollock fishing activities, for example, are not necessarily significant in considering the issue of marine debris and fur seal entanglement. Also, NOAA Fisheries' 2002 Marine Mammal Stock Assessment document notes that "recent rapid development on the Pribilof Islands" is cited as possibly negatively affecting fur seal habitat. As written, the assessment report appears to require a condition based on a presumed relationship between pollock fishing activities and a decline in the fur seal population when, in fact, the cause of the decline of northern fur seal populations is unknown.

<u>Principle 2, Indicator 2.1</u>

APA disagrees that the fishery falls below the 80 scoring guidepost for this indicator, and we refer the assessment team both to the NRC report from December 2002 and to the June 2003 Supplemental Analysis of the Bi-Op in which a compelling case is made that Alaska pollock fishing is not affecting the recovery of SSL populations.

Beyond that issue, we ask the team to reconsider the condition requiring the agency to produce extensive reports on bycatch in the BS/AI pollock fishery. Whether calculated as a percentage of catch or by weight, bycatch in the pollock fishery is insignificant. The mid-water BS/AI pollock fishery is among the cleanest in the world, and the team identifies no significant issue related to bycatch in the fishery.

It is simply an indulgence for disaffected stakeholders to require the management agency to prepare a detailed published report on bycatch in the pollock fishery. Such a report would contribute nothing to improved management of the fishery. The agency cooperates fully with all stakeholders who submit data requests, and no evidence to the contrary has been offered by stakeholders. Data that is available and that can be provided to the public within the construct of the law is made available in a timely manner. We urge the team to reconsider this mandate which appears to be of questionable value and further burdens an already overburdened management authority.

Principle 2, Indicator 2.2.1

We recommend that the assessment team drop the first sentence of the condition language for Indicator 2.2.1. The language, as drafted, requires that the fishery "adjust management to be more precautionary where impacts on (SSLs and fur seals) cannot be ruled out." This language could create confusion. Some readers might believe the assessment team is recommending specific changes to fishery management regulations. Appropriately, the assessment team makes no such recommendations. We also believe that the threshold is inappropriately set where impacts "cannot be ruled out." Rarely, if ever, does science provide such definitive results. As the assessment team knows, while the NRC panel did not find conclusive evidence to rule out the hypothesis that pollock fishing affects sea lions, the NRC considers it to be a second tier hypothesis at best.

We also recommend that the condition subjecting satellite telemetry data to external peer review be clarified to include data and results used in preparing the supplement to the 2001 BiOp. We also recommend (see #1 of the condition) that the deadline for results of external peer review be tied to *issuance of the certificate* and not to *the final determination*. In the unfortunate circumstance that an objection to the final determination is filed and a protracted objections process ensues, work on conditions would likely be delayed until the MSC issues the certificate.

With regard to points #4 and #5 of the condition, we question the need to restate condition language appearing under other indicators. However, if this language is not stricken, we request that references to fishing vessels and fishing gear be explicit to the U.S. pollock fishing fleet. As stated earlier, it is not be the responsibility of the pollock fishery, or applicant, to resolve natural resource management issues pertaining to non-pollock fisheries.

Principle 2, Indicator 2.3.1

The assessment team should be aware that the SSL Mitigation Committee met to discuss the NRC's recommendation to conduct an experiment that tests the effects of groundfish fishing on SSLs. Chaired by Dr. Doug DeMaster, NOAA Fisheries' chief scientist in the Alaska region, a subcommittee of the SSL Mitigation Committee reported to the North Pacific Council that there are "complex scientific and legal issues involved" in establishing such an experiment. (See North Pacific Council newsletter on the October Council meeting.) The condition for Indicator 2.3.1 should be redrafted to allow the management authority flexibility to develop a practical approach that best meets the challenge of assessing the effects of pollock fishing, if any, on SSL behavior, breeding and population trends."

We also offer a word change in the condition, replacing the word "suggested" with "possible."

Principle 2, Indicator 3.1

The condition for Indicator 3.1 jumps to the conclusion that there is significant gear loss and at-sea waste associated with the U.S. pollock fishing fleet. The team might believe that an assessment of the significance, if any, of gear loss and at-sea wastes is warranted. If so, the condition should require only that such an assessment be performed and that consultation with the certification body on the findings of such assessment be initiated, which could result in development of an action plan.

Principle Three

Principle 3, Indicator 3.1

APA recognizes that certain stakeholders are disenchanted with the management authority, although we disagree that those stakeholders have demonstrated a commitment to scientific evaluations of the fishery. For example, upon issuance of the draft BS/AI MSC pollock assessment report, Gerry Leape of the National Environmental Trust was quoted in the media as saying, "This study was bought and paid for by…industry." Mr. Leape's comments, unfortunately, too often characterize the environmental community's dismissal of science-based approaches to fisheries management.

While the environmental community appears to have slight regard for the assessment team's integrity, it appears that the assessment team overstates the contributions of the environmental community in fishery management debates in Alaska. Please remember that Court rulings against the agency on two discrete issues—SSLs and Essential Fish Habitat (EFH)—have been on procedural grounds. Many of the environmentalists' contentions, including a call for harvest reductions in the SSL case, were not accepted by the Court.

Nonetheless, we bow to the more charitable view of the assessment team. However, we urge flexibility in how the management system assesses its interaction with constituents. We do not believe that it is necessary for the agency or the Council to "commission an independent evaluation" of interactions between the management authority and non-industry stakeholders. We suggest that the management authority be given the latitude to select an approach that demonstrates that the agency is equally accommodating to all stakeholders in considering their views.

Thank you for considering these comments.

Dr. Chet Chaffee, Project Manager
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608, United States

December 22, 2003

Sent via email

Dear Chet,

We are writing in regard to the draft *MSC Assessment Report for the United States Gulf of Alaska Pollock Fishery*. These comments are submitted on behalf of Alaska Oceans Program of Alaska Conservation Foundation, Earthjustice, National Environmental Trust, and Oceana. We appreciate the opportunity to provide these and future comments on the draft determination regarding certification. Please recognize further detailed comments will follow.

We strongly disagree with the outcome of your draft assessment of the Gulf of Alaska (GOA) pollock fishery. We are quite surprised that your team concluded that the GOA pollock fishery should be MSC certified given the fact that the GOA pollock stock biomass is at only 28 percent of unfished spawning biomass or at 24 percent if the risk adverse assumption is made that the 1999 year class is of only average abundance according to the NMFS stock assessment. As your report notes "Both of these levels (28% and 24%) are well below the B_{msy} proxy of $B_{35\%}$." (p. 50). The GOA stock should be declared as overfished and failed outright according to the MSC standard rather than awarded the accolade of MSC certification. We urge your team to reconsider all of the information we have provided regarding the GOA pollock fishery because your analysis fails to represent that your team understood fully the issues we raised.

We submitted extensive comments on the draft *MSC Assessment Report for the United States Bering Sea and Aleutian Islands Pollock Fishery*, detailing our general concerns about the lack of transparency involved in the recent stages of the assessment process and problems with the conditions as well as specific issues with the performance indicators (PIs) and the conditions associated with the apparent deficient scores on the PIs. As much of the information you presented in the draft certification determination for the Bering Sea and Aleutian Islands (BSAI) pollock fisheries is similar or identical to the information you presented in this draft determination for the GOA pollock fishery, we incorporate by reference into this document the sections of the BSAI comments that discuss the problems with the process and general concerns about conditions. Rather than repeat the exact same concerns, we summarize our concerns below. We disagree with the following and urge the team to address these issues in the final report:

- the MSC policy that allows the client to receive a copy of the draft determination months before the public release of the document, purportedly to correct any factual misrepresentations of information, despite the fact that the client could alert the team to factual errors during the public comment period.

- the MSC or SCS policy or procedure that permits clients to approve or disapprove whether stakeholders are given time extensions to comment on draft certification determinations, despite the fact that purely procedural matters should be solely within the MSC's and the certifier's discretion.

- the MSC policy to not include the scoring and weighting attributed to the individual performance indicators (PIs) in the draft certification determination, despite the fact that this information is critical for stakeholders to understand exactly how the team evaluated the fishery and how to most responsively comment on the draft determination.

- the decision to not include the At-sea Processors Association's (APA) detailed response to all the scoring indicators as an appendix to the draft report, despite the fact that the report include the other two (provided by conservation stakeholders) of the three major written submissions on the performance of the fishery with regard to the MSC principles and criteria.

- the decision to certify the fishery and then allow the fishery to meet the conditions, despite significant problems with the fishery and management that should be required to be remedied prior to any certification.

- the failure in the conditions to require more action in addition to research and written reviews.

Also, we urge the team to address the following issues in the final report:

- the need to emphasize the fact that you are requiring the conditions for ongoing certification because it is not communicated prominently in the draft report, unless you change the conditions to be required prior to certification.

- the need throughout the draft determination to replace the word "condition" with the term "corrective action" to connote a required action after certification in accordance with MSC practice.

- the need for improved presentation of the conditions to demonstrate which require distinct responsibilities of the fishery and which refer to other conditions.

- the need to reiterate that all conditions are required regardless of whether they are in APA's direct control.

We will supplement this letter with specific comments on the PIs for the GOA pollock fishery as we did for the BSAI pollock fisheries. Much of the information you present in the GOA draft determination regarding the PIs and associated conditions is very similar to that presented in the BSAI draft determination, especially regarding Principles 2 and 3. The main difference regards the evaluation of the stocks under Principle 1. As such, the majority of the new comments will pertain to the problems with your analysis of the Principle 1 PIs and conditions for the GOA pollock stock. We will also discuss almost all of the PIs under Principles 2 and 3, adding new information specific to the GOA pollock fishery.

Best regards,

Stacey Marz

Dr. Chet Chaffee, Project Manager
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608

January 19, 2004

Sent via email

Dear Chet,

We are writing to supplement our previous comments in regard to the draft *MSC Assessment Report for the United States Gulf of Alaska Pollock Fishery*. These comments are submitted on behalf of the Alaska Oceans Program, Earthjustice, Greenpeace International, National Environmental Trust, Oceana and Trustees for Alaska.

We strongly disagree with the outcome of the SCS draft assessment of the Gulf of Alaska (GOA) pollock fishery and are deeply troubled that you and your team have decided to recommend certification of the fishery despite the stock's low biomass estimates that are below the maximum sustainable yield level (MSY). This fishery should be declared as overfished and failed under the Marine Stewardship Council (MSC) certification standard, instead of MSC certified as SCS has recommended. Precautionary management demands that in the face of low abundance estimates and uncertainty, protective measures be undertaken to protect the stock from continuing declines and ensure adequate biomass remains in the water for other predators. The recent North Pacific Fishery Management Council decision to increase the harvest level by 31 percent demonstrates the management is not employing the precautionary approach which is alarming, especially considering the many areas of uncertainty regarding stock assessments and setting harvest levels. Moreover, there is no agreement on the cause of the declining GOA pollock stock and continued and increased fishery exploitation when the stock is below MSY is shortsighted and reckless. The decision to recommend certification of this fishery according to the MSC standard and endorse the management's actions holds a fishery that is fishing on a stock with a dangerously low abundance estimate in an ecosystem with plummeting marine mammal and seabird populations as model for others to emulate. This is irresponsible and further demonstrates the flaws in the MSC certification scheme.

In addition, the assessment fails to address significant issues specific to the GOA pollock fishery such as the issues surrounding the bottom trawling that occurs, the lack of observer coverage for vessels under 60 feet and the inadequacy of coverage for vessels greater than 60 feet, and the issues regarding the GOA pollock fleet's overcapacity. SCS should consider these issues in great detail in your final determination regarding certification. Further analysis should reveal that SCS in its draft report glossed over the problems in these areas and downward scoring should result.

We urge your team to reconsider its decision to recommend certification of the GOA pollock fishery because your analysis fails to represent that your team understood fully the issues that surround this fishery. Please note that many of our comments are relevant to more than the PI that it specifically addresses and we wish SCS to apply the information to all PIs where appropriate.

Best regards,

Stacey Marz

COMMENTS ON THE

MSC ASSESSMENT REPORT FOR THE UNITED STATES GULF OF ALASKA POLLOCK FISHERY

Prepared by Stacey Marz, Esq.

Consultant to the Alaska Oceans Program
Alaska Conservation Foundation
441 W. 5th Avenue, Suite 402
Anchorage, AK 99501-2340
(907) 276-1917
stacey_marz@hotmail.com

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I. INTRODUCTION

Our first set of comments on the draft determination to certify the Gulf of Alaska (GOA) pollock fishery discussed the general issues we have with the lack of transparency inherent in the MSC policy and procedures you applied regarding the draft determination. We also discussed the general problems with the conditions associated with the deficient Performance Indicators (PIs).

This document considers the specific PIs under each of the three MSC Principles and speaks to the analytic flaws, omission of significant and relevant information and lack of rigorous scoring that exists in the draft report. We hope these comments help the team to revise the analysis and scoring in the final report. We urge the team not certify the GOA pollock fishery under the MSC Standard because the GOA pollock stock is at a dangerously low level, the fishery impacts the ecosystem and the management regime is ineffective and does not employ the precautionary approach.

I. EVALUATION OF SCS TEAM ANALYSIS OF MSC PRINCIPLES

The following three sections address the issues that are specific to the analysis and scoring under each of the three MSC Principles and the associated PIs. Please note that many of our comments are relevant to more than the PI that it specifically addresses and we wish you to apply the information to all PIs where appropriate.

A. MSC PRINCIPLE 1

MSC Principle 1 states "A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery." The GOA pollock fishery does not comply with Principle 1, or the Criteria and Performance Indicators that further define it. Abundance levels of the GOA pollock stock has declined to almost the lowest level in 30 years and is below the maximum sustainable yield (MSY) level.[524] The stock assessments fail to adequately consider the vast uncertainties and unknown information which end up compounding the risk of errors in calculating acceptable biological catch (ABC) and total allowable catch (TAC) levels. In addition, fishing has led to alteration of the age structure and geographic distribution of the stocks. Furthermore, the North Pacific overfishing definition is not responsive enough to insure that overfishing will not occur in the single species or ecosystem contexts. These issues contribute to the precarious nature of the pollock fisheries and the concern that rather than retaining the stocks' capacity for long-term yields, instead they are vulnerable to a crash, as has been seen already in some stocks.

<u>1. Issues in Principle 1 Narrative</u>

The narrative discussion in the beginning of the section on Principle 1 contains a number of issues that must be addressed.

[524] The report states that NMFS estimates the GOA pollock stock to be "28% of unfished spawning biomass and below B40%. . . . Assuming that the 1999 year class is only average in abundance, a risk averse assumption, the spawning stock in 2003 would decrease to . . . 24% of unfished spawning biomass." (p. 9). The SAFE report from November 2003 contains a slightly different estimate of 31% of unfished spawning biomass or using the risk averse assumption if the 1999 year class is only average in abundance, 27% of unfished spawning biomass. (M. Dorn et al, Assessment of Walleye Pollock in the Gulf of Alaska, SAFE (November 2003) p. 33). Regardless of which number is the more accurate, both reflect a low biomass estimate that is below MSY and our comments apply to both sets of estimates. For the purposes of these comments, we repeat the estimates used in the MSC Assessment Report for GOA pollock.

a. Issues in the Summary of Findings

Under the *Science* heading on p. 39, the report states that

Key areas of remaining uncertainty from a single species stock management point of view, despite considerable effort expended in scientific research in these areas, include the relative influence of natural environmental variation versus fishing on the populations.

The discussion fails to include the key areas of uncertainty from an ecosystem based management point of view. For example, it fails to point out the limited knowledge of the needs of pollock predators in the ecosystem. In the report prepared for the Alaska Oceans Network by John C. Fields, *A review of the theory, application and potential ecological consequences of $F_{40\%}$ harvest policies in the Northeast Pacific*, (November 2002) there is a detailed look at the areas of uncertainty associated with the management of the groundfish fisheries. This report was attached to the comments on the Bering Sea and Aleutian Islands pollock fisheries.

Under the *Monitoring* heading on p. 39, the report notes the positive aspects of the observer program but fails to point out the problems associated with the program. These include the problems identified in the reviews conducted by MRAG Americas such as the bias from vessels directly hiring observers and bias from non-random observer coverage in the 30% coverage category. This is an important omission as the 30% coverage category is the observer coverage that exists, if any, in the GOA pollock fishery.

Under the *Stock Assessment* heading on p. 39, the report should note that the assessment is single species model and fails to adequately consider the trophic dynamics in the ecosystem. It should also include discussion of uncertainties and the margin of error and risk associated with stock assessment advice for point estimates of ABC that correspond to $F_{40\%}$. The attached *CIE Review of the Gulf of Alaska Walleye Pollock*[525] contains information about the uncertainties in stock assessment data.

Under the *Status of the Resources* heading on p. 39, you should note that the GOA pollock fishery exploitation rates are based on a single species model that fails to adequately consider the prey needs of pollock predators.

Under the *Harvest Strategies* heading on p. 39, you note that the Tier 3 harvest control rule (HCR) used to manage GOA pollock was modified to close the fishery when the stock falls below 20% of average unexploited levels due to concerns about impacts of reduced prey levels on Steller sea lions. This was an ad hoc measure in response to the 2000 FMP BiOp and not a permanent measure. The FMPs have not been amended to reflect this modification from the ordinary Tier 1 HCR, nor do the FMPs contain any MSST level for any groundfish species. Also, there is no analysis of the unmodified Tier 3 approach whereby fishing exploitation rates are not reduced to zero until the target stock reaches 2% of unfished levels. The report should analyze the normal Tier 3 HCR and conclude that it is not precautionary enough to protect target stocks or the needs of pollock predators. Furthermore, there is no analysis as to whether the modified HCR B_{20} level is precautionary and instead should be B_{40} which is the OY level for the stock. The modified strategy is also not precautionary enough to protect target stocks or the needs of pollock predators; it is an ad hoc response to Steller sea lion concerns, not a permanent change to the FMPs, and the target stock's biomass level should be much higher (B_{40}) to trigger a reduced exploitation rate to allow the stock to rebuild.

[525] See *CIE Review of the Gulf of Alaska Walleye Pollock*, Olav Rune Godø, Nordåsbrotet 116 N-5235 Rådal Norway (August 2003).

On p. 44 you correctly note some of the weaknesses in the management of GOA pollock stocks.

Perhaps the main concern is uncertainty about the robustness of the strategies when some of the assumptions of the assessment models are not met. The key uncertainty for GOA Pollock concerns the relative impacts of the fishery and the natural environment on stock abundance, and arises from large natural fluctuations in stock size, including decadal or longer scale changes in productivity of stocks due to "regime shifts". This issue interacts with concerns about the impacts of harvesting Pollock on populations of Pollock predators. There has been no systematic attempt to explore the robustness of current harvest strategies to these issues or uncertainties. (p. 40).

We agree that it is a huge concern that assumptions of the assessment models may not be met. In the review conducted by CIE[526] on the GOA pollock stock, the author found "[s]ubstantial uncertainties are associated with basic assumptions, and survey methodologies and data collection procedures can be improved." Also, the lack of knowledge of the impact of harvesting pollock on populations of pollock predators is a huge problem. Further, the report neglects to highlight as a concern the fact the GOA pollock stock has declined significantly over the last 30 years, yet the Council is increasing the catch level 31% since last year. This is hardly precautionary management given the other concerns raised. The report's analysis under Principle 1 fails to adequately address this issue and impose conditions on the fishery to address these deficiencies.

2. Problems with Principle 1 PIs

The following comments deal specifically with problems in the analysis and conditions in the PIs associated with MSC Principle 1.

PI 1.1.1.1: The harvest control rule is well defined.
The analysis under this PI states that "the system involves explicit definitions for an overfishing level (OFL), and for a minimum stock size threshold (MSST). . . . The MSST is generally set at one half B_{MSY}, the biomass associated with MSY." (p. 41 - 42). This is incorrect. There are no explicit MSST levels set and the FMPs for groundfish stocks do not contain a single MSST level. The HCRs essentially eliminate the possibility that a stock will ever be declared overfished. This is not because a stock is not at a biomass level that should be overfished, but because there is no bright line below which the biomass level equates to an overfished declaration and the legal obligation to rebuild the stock under the Magnuson-Stevens Act. The score for this PI should be revised downward to reflect the lack of MSSTs set or a responsive overfishing definition.

PI 1.1.1.2*:* The harvest control rule is based on appropriate limits to the maximum exploitation rate.
The report scores the fishery above an 80 because the use of F_{MSY} as a limit to exploitation rate is consistent with current international best practice for single species harvest strategies. You also note on p. 43 that "[n]one of the overfishing limits in the tier rule take explicit account of impacts on associated species." Unlike in the BSAI draft determination, here you state "While krill is clearly a keystone prey species in the Southern Ocean ecosystem, it is not so clear that Pollock fills such a role in the Gulf of Alaska. Certainly at times in the past it appears to have been a relatively minor component of the community." (p. 43).

We disagree that GOA pollock should not be viewed as a keystone prey species. The analysis presented under this PI fails to support the statement above to demonstrate that pollock has been a minor component of the GOA

[526] See *CIE Review of the Gulf of Alaska Walleye Pollock*, Olav Rune Godø, Nordåsbrotet 116 N-5235 Rådal Norway (August 2003).

ecological community. In the Gulf of Alaska, pollock was the dominant prey in every year of sampling of groundfish food habits in the 1990s, consumed by Pacific halibut, sablefish, larger Pacific cod, larger arrowtooth flounder, great sculpins, and shortspined thornyheads.[527] The main piscivorous birds that consume pollock in the GOA are black-legged kittiwakes, common murres, thick-billed murres, tufted puffins, horned puffins, and probably marbled murrelets.[528] "Pollock is a major prey of the Steller sea lions and harbor seals in the GOA."[529]

Further, the report makes numerous references throughout noting pollock's important food web role. In fact, you state in the introduction to Principle 1 under the "Status of resources" section that the "stock is currently well below target reference points agreed in the FMP. This is of considerable concern, both from a stock management point of view, and also because of *pollock's important role in the Gulf of Alaska food chain.*" (p. 39 (emphasis added)). Also, under PI 1.1.2.1, you state pollock "appears to be a key prey species in its ecosystem" when explaining why you think B_{msy} is an appropriate limit reference point. (p. 49). The analysis under Principle 2 PI 1.1 recognizes GOA pollock's importance in trophic relationships: "Given the important of Pollock as the primary food for many 'top predators' in the ecosystem . . . ". (p. 78).

As you found regarding the BSAI pollock stocks, GOA pollock is similar to krill as a "keystone prey species" and that krill is managed at $B_{75\%}$ in the Southern Ocean. Similar to krill, GOA pollock should be managed to maintain a much higher biomass level for pollock predators. Such recognition would require a significant downward score for this PI because GOA pollock is currently at only $B_{28\%}$ of unfished value according to NMFS 2002 stock assessment. As such, the HCR is not based on appropriate limits to the maximum exploitation rate when considering the needs of pollock predators.

Fishing levels should be set in a highly precautionary manner to preserve ecological relationships between harvested, dependent and related species. The TAC-setting process should contain procedures and requirements to reduce maximum allowable fishing levels under the conventional "single-species" MSY rules to an Optimum Yield (OY) level that addresses both the cumulative effects of fishery-maximizing exploitation strategies that are designed to out-compete the other parts of the ecosystem, and local-scale impacts of spatial/temporal concentration of fishery catches.[530] Fishing for important forage species should be reduced to more precautionary levels to maintain the forage base for predators at high levels of abundance relative to the unfished condition as is done under the Convention for the Conservation of Antarctic Living Marine Resources (CCAMLR), which sets the harvest policy for important forage species such as krill (*Euphausia superba*) at $F_{75\%}$ in an effort to take the needs of predators into account.[531]

Uncertainty factors should be incorporated systematically into ABC/TAC-setting to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways. The overall approach reflects a policy objective to maintain a large margin of safety in recommending acceptable biological

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[527] NMFS 2001, Draft PSEIS, Sec. 3.3-7 and Table .3.3-4.
[528] NMFS 2001, Draft PSEIS, Sec. 3.3-7.
[529] NMFS 2001, Draft PSEIS, Sec. 3.3-7.
[530] Concerning ecological factors, the National Standard Guidelines give the scientific advisors and managers wide latitude to reduce the allowable fishing rates from the theoretical maximum level: "Examples are stock size and age composition, the vulnerability of incidental or unregulated stocks in a mixed-stock fishery, predator-prey or competitive interactions, and dependence of marine mammals and birds or endangered species on a stock of fish. Also important are ecological or environmental conditions that stress marine organisms, such as natural and manmade changes in wetlands or nursery grounds, and effects of pollutants on habitat and stocks." (NMFS 1998, 63 FR 24232).
[531] R.B. Thomson, D.S. Butterworth, I.L. Boyd, and J.P. Croxall. Modeling the Consequences of Antarctic Krill Harvesting on Antarctic Fur Seals. Ecological Applications, 10(6), 2000, pp. 1806-1819: "The Commission for the conservation of Antarctic Marine Living Resources (CCAMLR) takes the needs of krill into account in an indirect manner when recommending the annual krill catch limit. This is done using a single species model to estimate the size of the krill population (relative to its pre-exploitation size) after a 20-yr period of harvesting at a given intensity. The level of harvesting intensity is adjusted until the median krill spawning biomass is predicted to be 75% of its median pristine size."

catches in an environment where uncertainty is all-pervasive and even the best available scientific information is frequently full of unknowns.

To address the problems with the current HCR, Tiers 1-3 should set the target fishing rate at $F_{75\%}$ as an ecosystem proxy and set MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics) for important target prey species such as pollock. In addition, there must be explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species and habitats.

Tiers 4-6 target species for which there is not adequate information to estimate biological reference points (BRPs) and minimum stock size threshold (MSST), should have no directed fishery TAC specified until data is available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Stocks managed Tiers 4-6 should be designated as bycatch-only status and require full retention and utilization of bycatch species in Tiers 4-6.[532]

Uncertainty factors must be incorporated systematically into ABC/TAC levels to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways. Some ways this should occur are to:

- factor species-specific survey coefficient of variation (CV, the error bounds around biomass point estimates) into calculation of ABCs, e.g., using average CV of survey biomass estimates in time series and compute lower 90% confidence interval as fraction by which to reduce max $F_{ABC.,}$
- set ABCs on lower 90% confidence limit of model estimate for $F_{X\%}$ rather than midpoint (50%) of the range of probability (i.e., *require higher confidence in ABC estimate*).
- require the decision rules to limit the fishing rate to *no greater than* $F_{75\%}$ for species w/key ecological roles like pollock, vulnerable life histories, and situations of high uncertainty.
- consider expressly $B_{40\%}$ (or higher, depending on life history characteristics) a limit rather than target (i.e., MSST) with linear reduction in F rate below $B_{50\%}$ to F = 0 @ $B_{40\%}$.
- allow no directed fishing for species that data do not exist to calculate BRPs and MSST.
- employ spatial and temporal dispersion of TAC levels to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species & habitats.
- establish a basin-wide network of closure areas to protect target stocks as well as pollock predators, including spawning area closures, and gear closure areas to prevent habitat damage and act as hedge against multiple uncertainties).
- expand research to obtain biological reference points, improve knowledge of species' life histories and habitat requirements, role in the food web, etc.

<u>PI 1.1.1.3</u>: The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes. In recognition of the recent decision to adopt a zero ABC threshold at 20% of unfished spawning stock levels for pollock due to concerns about impacts on Steller sea lions, the team scored the GOA stock above 80. (p. 44). Except for noting that until recently the Tier 3 HCR specified that "zero ABCs would be called for only if stocks fell to 2% of unfished levels," there is no analysis to whether the Tier 3 harvest strategy contemplated in the FMPs would meet this PI. The report should analyze the unmodified strategy because the modified strategy is not permanent, was an ad hoc response to the 2000 FMP BiOp RPAs and the FMPs have not been amended to reflect the modified

[532] Note that this management measure does not imply endorsement of the existing IR/IU program as a means to meet the Magnuson Act's bycatch mandates. Rather, it is intended here as a data collection measure to improve target species management.

strategy. Analyzing the unmodified strategy clearly shows that the Tier 3 HCR does not involve appropriate reductions in exploitation rate because it takes a collapsed stock to trigger a zero ABC level.

History shows that the HCR do not result in appropriate reductions in exploitation rate at low stock sizes. Episodes of intense pulse fishing on spawning stocks in the Shelikof Strait from 1981 to 1985 were followed by sharp declines in pollock abundance. From 1980-1985, catches soared and 1.239 million metric tons of pollock were taken in the massive Shelikof Strait roe pollock fishery, concentrated on spawning grounds west of Kodiak Island. Despite a nearly ten-fold reduction in Shelikof Strait survey biomass by the late 1980s,[533] Gulf-wide pollock catches ranged from more than 65,000 mt to 88,000 mt during the late 1980s.[534] During the 1990s, biomass remained low compared to the estimates for the early 1980s yet catches totaled 933,000 mt over the decade and averaged 90,000 mt per year, reaching a high of 125,000 mt in 1998.[535] Throughout the entire time period from 1980, the majority of the catch (50-90% per year) was concentrated in Steller sea lion critical habitat.

Today, the GOA pollock stock is at only 28% of unfished biomass and below the MSY level. This abundance level is dangerously low for both management of the target stock under the single-species MSY theory and for the ecosystem needs for pollock as prey. Despite this low abundance level, at its December meeting the Council *increased* the catch level 31%. Clearly, the HCR fails to require reductions in exploitation rates when a stock is below its MSY level.

Further, there is not adequate consideration given to pollock predators in the ecosystem.

This PI should be scored downward.

<u>PI 1.1.1.4</u>: The harvest control rule results in reductions in ABCs as uncertainty increases

The report notes that the GOA stock is managed at Tier 3 that uses point estimates of biomass and fishing mortality rates. (p. 45). The report states that for GOA pollock, the 2002 SAFE report includes "several precautionary features that reduce the ABC due to uncertainties in the assessment. These include:

5. Fixing trawl catchability at 1 (rather than the model estimated value which is less than 1);
6. Assuming an average value for the 1999 year class, instead of the model estimated value which is much higher;
7. Not adjusting the Shelikof Strait survey biomass estimate, despite evidence that the fraction of the stock spawning in the survey area in 2002 was lower than normal;
8. Applying a more conservative harvest rate than the maximum permitted under the tier 3 harvest rule.

Point 3 should probably be discounted somewhat, as the action taken is the default assumption. Nevertheless, the overall impact is to reduce the ABC to less than 40% of the point estimate derived from the base case stock assessment model (Dorn et al, 2002)." (p. 45). Apparently the team finds these features convincing as it scores this PI above the 80 SG level.

The CIE Review of the GOA pollock stock discusses many areas where uncertainty is not adequately considered. The Executive Summary states the following:

[533] Dorn *et al*. Table 1.5, p. 1-36. Gulf of Alaska Stock Assessment and Fishery Evaluation (SAFE) Report as Projected for 2002. NPFMC, November 2001.
[534] Dorn *et al*. Table 1.1, p. 1-32.
[535] Dorn *et al*. Table 1.1, p. 1-32.

Information on the dynamics of distribution and migration is very limited and our knowledge of the stock structure is inconclusive. Major issues of importance to stock assessment, involving the assumptions associated with applied methodologies, are related to intermingling with the Bering Sea pollock, the degree of coverage of the stock by the surveys, the availability of the total distribution of fish to the survey gear used (acoustic and bottom trawl), etc.

Surveys are carried out systematically and thoroughly, although there are details of the technology, equipment and procedures that could be improved. All surveys suffer from the lack of total vertical and horizontal coverage of the stock, which means that there is a high probability that different portions of the stock are covered in different years, particularly in situations of abrupt change, e.g. as caused by regime shifts or overexploitation.

The NMFS bottom trawl survey should consider the mesh selection of the trawl and ways of reducing it. The applied doors are very light (1,250 lbs), which may result in unstable bottom contact and may be responsible for variable efficiency in the herding zone and the trawl mouth. The use of survey outcome as absolute abundance estimates is questionable. This survey needs to be expanded with a simultaneous acoustic survey to encompass the total biomass of pollock, or at least to assess the availability of pollock to the trawl gear.

The echo integration trawl (EIT) survey has estimated the biomass of the stock in the major spawning area annually since 1981 and is a major element in the annual evaluation of the stock. Vertical profiles of the stock distribution should be presented in order to evaluate annual variation and potential effects on survey results. These profiles should also be used to assess and compensate for the dead zone problem. Behavioural effects on survey results are being studied and need more detailed attention, in particular observations of escape effects during trawling, which is of importance for the reliability of both the bottom trawl and EIT surveys. The acoustic target strength (TS) used for pollock is based on studies of individuals during summer and is probably not representative of the TS during the spawning season.

The number of otoliths sampled seems to be low for both surveys and the commercial fishery. The problem of whether small sample sizes represent large catches needs further attention. Some confusion exists regarding stages of maturity and their current classification into mature or immature individuals. Much histological material exists that could resolve the issue and provide information about the number of first-time and multiple spawners.

Fish “leakage” to or influx from the Bering Sea probably occurs. This might be a periodic problem of unknown dimension. Tagging, although it has not been very successful so far, seems to be the only viable way of investigating this problem. Small, passive integrated transponder tags that can be automatically recognized on board factory trawlers could be worth trying.

This demonstrates that there are numerous areas of uncertainty in the data used in the stock assessments and in calculating ABCs. As such, the score should be revised downward to the 60 SG level because the HCR does not account adequately for uncertainties in stock status.

PI 1.1.1.5: The harvest strategy can be shown to be precautionary.
The report notes correctly on p. 46 that there has been “no comprehensive simulation testing of the harvest strategies used for pollock management, nor attempts to test their robustness to a wide range of uncertainties and assumptions inherent in stock assessment and management (Goodman et al, 2002).” The report states that such

methods are now widely used in developing and testing both generic and fishery-specific harvest strategies and implemented to test broader ecosystem-based management strategies. In 2002, the Council commissioned a report by Goodman et al evaluating the harvest strategy. Goodman et al recommended testing the robustness of the NPFMC harvest strategies in general and providing specific suggestions on how to conduct such an evaluation. From Goodman's suggestions, the team required the following condition to address the deficiency in PI 1.1.1.5:

SCS requires that formal evaluation and testing of the robustness of current and any proposed new harvest strategies used to manage EBS and AI pollock be undertaken, using methods similar to those recommended by Goodman et al. (2002). The SCS evaluation team requires that any plans to correct this deficiency lay out a step-wise plan with timelines such that at least three stages of work would be available for evaluation:

1. Prepare detailed specifications for the evaluation.
2. Undertake the evaluations.
3. Modify harvest strategies as appropriate from the results of the evaluations.

The report provides specific notes related to tasks on page 47 that point to Sections 3.10 and 3.11 within Goodman et al for guidance in meeting this condition. While Goodman et al's suggested proposal for management strategy evaluation (MSE) has a single species focus,[536] the SCS report states that "[c]onsideration should be given to including operating models that go beyond single species dynamics, where these are available or can be developed, and performance measures should include consideration of impacts on predators." Goodman et al points out that there are models in use or under development at the Alaska Fisheries Science Center dealing with bycatch and technical interactions and dealing with broader ecological interactions. Goodman et al also recognizes on p. 73 that "there appears to be little or no use of these models in framing management advice for the BSAI/GOA FMP, at least with regard to ABCs." Thus, while the condition required for PI 1.1.1.1.5 to evaluate and test the robustness of the current harvest strategies is a step in the right direction because it provides for much needed evaluation of the current strategies, it does not go far enough. You should require in the condition that APA evaluate and test operating models that concern ecosystem-based management, rather than telling APA to consider going beyond single species concerns. In addition, your condition has no timelines associated with it. It should require APA to meet Step 1 within three months of certification, begin the evaluations contemplated in Step 2 within six months and finish the evaluation within one year and modify harvest strategies as a result of the evaluations required in Step 3 within two years of certification. The condition requires the evaluation results to be made available to the Council and the SCS team. These results should also be made available to stakeholders. Any workshop held should be open to stakeholders who should have the opportunity to have input into changes in the current harvest strategies based on the evaluation.

Furthermore, the recent decision to increase the harvest level by 31 percent when the GOA pollock stock has experienced significant declines over the last thirty years is hardly precautionary. Reducing exploitation is the more precautionary approach when the stock is below MSY, multiple sources of uncertainty surround the stock assessment, including those associated with the models and surveys, the ABC and TAC levels, and the reasons for the decline of the pollock stock and the pollock predators in the GOA are not known with certainty.

PI 1.1.1.6: The harvest strategy is properly applied.

The report notes on p. 48 that "there have been fairly regular changes to the details of the harvest strategies over the years. These changes are subject to evaluation under NEPA legislation and have generally (though not always) resulted in more precautionary strategies being adopted." This characterization is not entirely accurate. As

[536] Noting the MSE's "initial focus should be on single species operating models." Goodman et al (2000) at 73.

discussed in depth in our comments submitted in April 2002, the agency has had a significant problem complying with NEPA. Over sixty amendments each to the GOA and BSAI FMPs have occurred since the original EIS on the initial FMPs over twenty years ago without a new legally valid EIS that evaluates all the amendments cumulatively. The programmatic review of the FMPs under NEPA is continuing presently. The revised draft Programmatic Supplemental Environmental Impact Statement (PSEIS) is fundamentally flawed and legally insufficient.[537] The report should note that there has not been an adequate NEPA evaluation to date evaluating all the changes to the FMPs and harvest strategy.

PI 1.1.2.1: Current stock sizes are assessed to be above appropriate limit reference points.
The report notes on p. 49 that this PI was the subject of considerable debate during the course of the evaluation, with the main point of contention was the choice in the scoring guideposts of B_{MSY} as a limit reference point, since it is used more as a target reference point in the tier system, with half B_{MSY} being regarded as the limit reference point. The evaluation team chose B_{MSY} as a limit reference point for pollock in recognition of pollock's role as a key prey species in the ecosystem. "Noting that the generally accepted proxy for B_{MSY} for pollock is $B_{35\%}$, the SCS evaluation team felt that half B_{MSY}, or $B_{17.5\%}$, (which is the current biomass limit reference point for pollock used by the NPFMC) was too low a level to serve as an appropriate limit reference point for this species." (p. 49).

The report notes that the 2002 assessment for the GOA stock shows the population to be at 28% of unfished spawning biomass, or at 24% if the risk adverse assumption is made that the 1999 year class is of only average abundance. (p. 50). Significantly, the report states "*Both of these levels (28% and 24%) are well below the B_{msy} proxy of $B_{35\%}$. On this analysis, the GOA stock would fail this scoring indicator (score less than 60).*" (p. 50 (emphasis added)). However, the team concludes that regime shifts in the GOA are responsible for the decline of the stock and not exploitation by the groundfish fisheries. The team relies information that Martin Dorn, the GOA pollock stock assessment leader for the Alaska Fisheries Science Center, provided in answer to questions posed by the team. Allowing for the assumption that unfished biomass can be calculated in the manner suggested, the results follow:

5. Stock size for GOA pollock would have varied almost tenfold since 1960, even in the absence of fishing (Figure 1, Appendix 3).
6. The declining trend in abundance since the early 1980s (Dorn et al, 2002) is also evident for the unfished stock (Figure 1, Appendix 3).
7. The lowest relative depletion level in the time series is 59% of the corresponding unfished level for 3+ biomass, and 44% of the unfished level for female spawning biomass (Table 1 and Figure 4, Appendix 3). Both are well above the $B_{35\%}$ proxy for B_{MSY}.
8. Exploitation rates for GOA Pollock have generally been low, although there is an overall increasing trend to the time series (Figure 3, Appendix 3), and a tendency to higher exploitation rates at lower stock sizes.

The team concludes that the "poor status of GOA Pollock seems to be due to a long period of generally poor recruitment, rather than to exploitation rates having been too high." (p. 51).

The team finds that Martin Dorn's results

suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level <u>relative to where it would have been now if the stock had never been fished</u> is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these

[537] We provide specific comments on the problems with the SEIS under Principle 3.

levels are well above the proxy $B_{35\%}$ level for B_{MSY} if the latter is viewed as a potentially dynamic quantity. If environmental variability is ignored and B_{MSY} is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below B_{MSY}, and the stock is overfished based on the standard suggested for this scoring indicator.

The team recognizes the two views of stock status described in the above excerpt. But, the team finds that environmental variability impacts the stock status for GOA pollock, relying on Martin Dorn's information. The report states that

variability is an important feature of the dynamics of Pollock in the GOA, with population levels potentially fluctuating tenfold even in the absence of fishing. Although the system has only been observed through one of these cycles, it seems reasonable to suppose that such variability is a natural feature of this ecosystem. If so, then predators of species such as Pollock must also have had to cope with such variability in the past. They may well be adapted to such variability, and have a variety of mechanisms (such as prey switching) to deal with it. The results in Appendix 3 (Figure 1) suggest that fishing has served to accentuate rather than fundamentally change the nature of that variability. That in itself may be of concern – with a constant exploitation rate, the low points in the cycle would be lower with fishing than without it. On the other hand, the fact that stock levels falls below an average $B_{35\%}$ level may not be of substantial concern, if such events are commonplace even in the absence of fishing. However it seems reasonable to suppose that there ought to be a "bottom line", a level below which it is undesirable for the stock to fall on the grounds of ecological impacts on the ecosystem, and hence below which exploitation should cease. Under the current GOA harvest strategy for Pollock, that level is 20% of average unfished levels. Given the apparent level of natural variability in the stock, and the calculation that, even with a maximum exploitation rate of $F_{75\%}$ (i.e. a target stock size of $B_{75\%}$) the stock would still fall below $B_{35\%}$ almost 20% of the time (Martin Dorn, unpublished data), a 20% bottom line seems not unreasonable. (p. 52).

The team scores this PI below 80 but above 60 "due to the current low level of absolute abundance and its possible wider ecological impacts (especially for predators). However the evaluation team takes note of the possibility that much of the decline in abundance may be due to environmental factors, and that the stock appears in general to have been responsibly managed as far as exploitation rates are concerned." (p. 52). To address the deficiencies at the 80 SG level, the team requires the fishery to meet the following condition:

7. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation.
8. The GOA plan team and the SSC should review and comment on the additional evidence presented to the SCS evaluation team by Martin Dorn (Appendix 3 and other unpublished data).
9. The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour.

We strongly disagree with the team's analysis under this PI. The GOA stock should fall below the 60 SG level because its abundance estimates are dangerously low and below MSY. Your analysis involves gross speculation.

The issue is not whether variability is a natural feature of the ecosystem, but how much has fishing changed the nature of that variability. This is impossible to assess definitively. As such, it is imperative to manage the fisheries in as precautionary a manner as possible regardless of what has caused the low stock size. This involves lowering TAC levels, if fishing is permitted at all. However, the Council recently *increased* the harvest level 31 percent despite the fact the GOA pollock biomass is low and below MSY. Further, relying on the strength of the 1999 year class is dangerous as many of the assumptions in calculating the stock estimate may be overestimated. Given the low biomass estimate, it would be more precautionary to leave more of the 1999 year class in the water to mature and grow.

As noted by Dayton et al. (2000), without reliable baseline data to compare the current state of the ecosystem to an unfished environment, the causes of ecosystem changes in a complex system can always be argued.[538] Undoubtedly environmental forces play a large (though not well understood) role in determining the population dynamics of fish species, particularly on a year-to-year basis in a variable high-latitude marine environment, as do ecological interactions between species in the marine food web. But it must be said that no theory of "regime shifts" has shown an effect on any fish population as profound as that which is *assumed* in the stock assessment models and theory of MSY, which approximately doubles the estimated annual mortality on stocks such as pollock, by design (Field 2002).

In addition, the discussion asserts that that B_{MSY} is used as a target reference point in the tier system, rather than a limit on p. 49. Then the discussion concludes that B_{MSY} is a limit reference point. As this PI is supposed to evaluate "limit reference points" the fishery should score below 60 on this PI (in addition to the GOA stock's low abundance levels). In addition, please read section 3 *Shortcomings of Reference Point Based Fisheries Management* at p. 46 in John C. Field, A Review of the Theory, Application and Potential Ecological Consequences of $F_{40\%}$ Harvest Policies in the Northeast Pacific, Prepared for the Alaska Oceans Network, November 2002. 101 pp., to understand our concerns about the inadequate treatment of uncertainty in reference point based fisheries management.

Next, notwithstanding our disagreement with your analysis under this PI, your condition fails to include any timelines for any of the three requirements. See our comments under PI 1.1.1.5 to understand our concerns with the condition that you referenced under the No. 1 requirement for this PI. Also, you should require that the No. 2 and No. 3 requirements be met immediately.

PI 1.1.2.2: Current exploitation rates are below appropriate limit reference points.
The report states:

While it is of concern for GOA Pollock that exploitation rates have tended to rise as the stock has declined (Figure 3, Appendix 3), recent exploitation rates have been falling and are below the proxy for F_{MSY}. The submission by APA points out that the large increases in exploitation rates in 1997 and 1998 were the result of an agreed change to the tier system to conform to the 1996 amendments to the Magnuson-Stevens Act. They therefore claim that, while in retrospect this may have resulted in poor decisions given the continuing decline in the stock, this was the result of Council decisions for a carefully managed fishery, and not a symptom of a loosely managed fishery increasing its exploitation rate to maintain catches. SCS is aware of the many changes to the management system over time, and has based its evaluation for this scoring indicator on the current state of the fishery. (p. 54).

[538] Paul K. Dayton, Enric Sala, Mia J. Tegner and Simon Thrush. Marine Reserves: Parks, Baselines, and Fishery Enhancement. Bulletin of Marine Science, 66(3), 2000: 617-634.

The analysis under this PI is inadequate. There is no analysis about whether the limit reference points are appropriate, what these limit reference points are and what the current exploitation rates actually are. There is no discussion about the adequacy of these rates in regard to single species management versus ecosystem-based management. The SGs require that the stock assessments show the current exploitation rate to be below the limit reference point with either 90% probability for the 100 scoring guideline (SG) or 70% probability for the 80 SG. However, the scant discussion quoted above does not contain any discussion regarding the probability the assessments are within the limit reference point. As such this discussion needs much greater specificity to avoid glossing over the requirements of this PI. This PI should be scored downward.

PI 1.1.2.3.1: Assessment models are appropriate to the biology of the stock and the nature of the fishery. The report notes on p. 54 that the GOA assessment uses state of the art methods for single species but does not take explicit account of predation mortality. It also states that the spatial structuring within the GOA is reasonably well studied and understood, but the models are not explicitly spatially structured although the assessments account for spatial structure in some regards. The team scored this PI above 80.

The analysis recognizes that the GOA stock assessments fail to take explicit account of predation. Numerous other places in the report correctly reflect that pollock is a key prey species and as such warrants a condition requiring consideration of the predation mortality needs in assessment models at the 80 SG level.

Further, the review of GOA pollock by CIE reveals significant uncertainties regarding the biology of the GOA pollock stock:

The core area of GOA pollock is the region between longitude 130 W and 170 W within the shelf and slope of the Gulf of Alaska (Barbeaux *et al.* 2002). Several spawning areas are known within the area but their long-term importance for total recruitment is still uncertain. The Shelikof Strait spawning has been believed to be dominant but changes in distribution and abundance in recent years have cast uncertainty on its temporal stability. The fish spread out over the feeding area after a well-defined spawning period, which seems to vary significantly in time from one spawning area to another. A major uncertainty is related to the potential leakage or influx of biomass from the Bering Sea stock of pollock. An animation of catches over time shown by Jim Ianelli indicated dependences in the geographic distributions in the GOA and the Bering Sea. A leakage would barely be recognised in the much bigger stock of the Bering Sea, and would appear in the form of an unexpectedly high fishing mortality, similar to what has been experienced in recent years (Dorn *et al.* 2002). Further, the stock is regarded as being confined to the shelf and slope area although gadoids are known to spread out to pelagic areas, like pollock off the shelf break in the Bering Sea and blue whiting in the northeastern Atlantic (Heino *et al.* 2003). The stock unit issue seems to be unresolved on the basis of the available genetic studies (Bailey *et al.* 1999) and as stated by Kevin Bailey during talks, if a mass tagging method for pollock could be developed, this would probably be the best means of resolving the management unit problem. Tagging, although not very successful, needs more attention. Small passive integrated transponder (PIT) tags that can be automatically recognized on board factory trawlers or by the shore based industry could be worth trying. Mortality during tagging seems to be the major limiting factor. Modern automatic tagging methods should be paid attention in order to see whether they can be modified for tagging pollock.

The conflicting annual signals given by the surveys might also be due to unknown variability in the three-dimensional distributional dynamics of the stock. Habitat preferences (pelagic/demersal) for year-classes of different strengths could cause a substantial problem (see Godø and Ona 1999). This problem will be further discussed under the survey sections.

Maturity at age information also causes problems for the assessment. The main source of information, the EIT survey, shows extremely variable maturity data from one year to the next (Dorn *et al.* 2002). Furthermore, a decline in abundance such as was observed during the late 1980s and 1990s would be expected to result in an earlier age at maturity while the opposite was actually observed (Dorn *et al.* 2002). No detailed studies of the causes of this problem seem to be available. As year class strengths vary greatly, the proportion of mature and immature fish may change as a strong year-class cascades through the stock. This phenomenon could alternatively be an artefact (sic) caused by unequal survey coverage of mature and immature fish over time. The data are based on a very detailed table for allocation to maturity stage after visual inspection. Bernard Megrey told the meeting about a large amount of gonads that have been sampled over a long period of time. Comparing the results of detailed histological studies of the gonads with the maturity stages employed could be very useful in validating the current protocol. Furthermore, such studies might well provide more information about the relationship between spawners and immature fish, and possibly between first-time and multiple spawners (see Saborido-Rey and Junquera 1998, West 2000 for more information). A European Union project is currently under way (Reproduction And Stock Evaluation for Recovery) and substantial new information from laboratory experiments and studies of fisheries data is expected. The web address http://raser.imr.no/projectstructure.php provides an overview of the project and lists active scientists for contact.

The temporal dynamics of the GOA ecosystem are spectacular, with the dramatic increase in pollock during the late 1970s and early 1980s, the outburst of arrowtooth flounder, and the decline in Steller Sea Lion as the most prominent features. The recent difficulties in GOA pollock assessment need attention from an ecosystem perspective. The data presented open up the possibility that the unexploited stocks of Steller Sea Lion and arrowtooth flounder are competing for pollock alongside the commercial fisheries. The available information from surveys and fisheries is not designed, and hence is not adequate (see below) for carrying out reliable quantitative ecosystem studies. (CIE p. 3-4)

In addition, the report does not recognize that fishery stock assessments do not assess the spatial distribution of stock biomass, the movement of fish over the course of the year, or the spatial and temporal effects of fishing. ABCs are set at the area-wide scale of the "stock as a whole" and on a start-of-year basis (PSEIS VIII, F-2-30), but fisheries concentrate effort in highly productive areas and times of high catch per unit of effort (CPUE), for economic reasons. Spatial/temporal concentration of fisheries increases the risk of overfishing and adversely impacting reproductive success of target stocks, their habitats, and dependent and related species. (PSEIS IV, 5-15, 16; PSEIS II, 4.5-280; Appendix F-2, 3, 4.) The TAC-setting process should include procedures to evaluate and address explicitly the spatial/temporal dimensions of fishing impacts for target, non-target and protected species, and habitat protection, recognizing the limits and imprecision of available information.

To address these concerns about spatial/temporal distribution of stock biomass, the report should require that stock assessments include all the relevant data to facilitate Plan Team evaluations and recommendations for spatial/temporal management of each target fishery. This includes:

- Each stock assessment will include distribution maps of fishing effort and catches by area and time of year using available Observer Program data, and information on the geographic and seasonal distribution of stock biomass from available survey data.
- Each stock assessment will include an evaluation of how the distribution of the species and fishery have changed (or not) over time, and why these changes have occurred (e.g., environmental, socioeconomic, or regulatory factors that have affected spatial/temporal distribution of stock biomass and fishing effort).

- The stock assessments will include maps of EFH for the target species and evaluate fishing locations and catches relative to EFH, HAPC living habitat, and bycatch of non-target species.
- The stock assessments will include relevant statistics on levels of catch in Steller sea lion critical habitat or other affected habitats of protected and vulnerable species, integrating data and advice from Office of Protected Resources, National Marine Mammal Laboratory, and the fishery Observer Program.

A checklist of criteria should be employed to assess appropriate spatial/temporal management of each fishery, based on management objectives for target, non-target and protected species, and habitat protection. For example:

- How do local or regional fishing mortality rates compare with the target fishing mortality rate for "the stock as a whole"? Are disproportionately high catch rates (i.e., relative to the standing stock in the area) indicated or possible, based on available survey information, fishery CPUE data or vulnerable habitat type?
- Are patterns of serial depletion area by area indicated or possible due to concentrated fishing pressure on localized subpopulations of a stock in vulnerable EFH (e.g., spawning grounds)? Have changes in stock biomass distribution and fishery effort occurred over time, based on known historical distributions of the stock and fishery?
- How is fishing effort distributed relative to EFH (e.g., spawning, nursery, foraging habitat) and HAPC?
- Are localized depletions of important forage species indicated or possible due to fishery overlap with foraging areas of predators (e.g., SSL, NFS, whales, seabirds)?
- What is the fishery impact in regulated areas of critical habitat of protected species, by area and season?
- Are "hotspots" of high bycatch of non-target and Prohibited Species indicated in fishery Observer Program data?

Based on the evaluation of fishery data using these criteria, the groundfish Plan Teams will make recommendations for spatial and temporal management of the fishery along with ABCs, and identify critical information needs/gaps:

- Provide clear explanations of rationale and information used to apportion ABC by areas and seasons, or reasons for not doing so.
- Include recommendations for gear restrictions, gear closure areas, bycatch-triggered closure areas, or other measures that would address identified or potential impacts of concern.
- Identify further research and survey information needed to address unknowns.

In addition, in-season managers must have flexibility to act quickly to avoid harm and address problems that arise based on new information, including:

- Provide "Hot Spot" authority for managers to make timely inseason reductions to TAC specifications as necessary to close a directed fishery, close areas of high bycatch, or otherwise modify a fishery to prevent overfishing, exceeding bycatch limits, or adversely impacting protected species and their critical habitats.

<u>PI 1.1.2.3.2</u>: Stock assessment methods are statistically rigorous.

The report notes that there has been no direct testing of the methods used explicitly for pollock stock assessments at p. 55, but that such testing "would be difficult given the complex nature of the models and fitting procedures." This statement too easily dismisses the need for testing the stock assessment methods.

Furthermore, as Field (2002) points out, determining the "correct" point estimate of yield corresponding to the target fishing mortality rate is fraught with uncertainty even for stocks considered to have the best data and the most sophisticated stock assessments:

As an example of how error is quantified in stock assessment results, the 1999 assessment for Eastern Bering Sea pollock (NMFS 2000, citing Ianelli et al. 1999) included estimates of uncertainty associated with three alternative fishing mortality rates; F_{MSY}, $F_{40\%}$ and $F_{30\%}$. The $F_{40\%}$ strategy suggested a point estimate of 1.013 million metric tons as the appropriate yield, yet the 50% confidence limits for this estimate were 0.6 million to 1.7 million metric tons and the 95% confidence limits were between 0.2 and 3.0 million metric tons. The expected probability of overfishing with the target yield was 30% in that example, but perhaps most important is that this stock is the only one assigned to the highest data-quality tier in the North Pacific Council jurisdiction.[539]

. . .

The result is that any uncertainty presented for management purposes is but a part of the true overall uncertainty. Thus, when a model suggests that a given harvest rate has a 50% probability of resulting in a biomass level of $B_{40\%}$, such information is based on thousands to millions of simulations in which a wide range of plausible parameter values are estimated, but in which the true dynamic nature of such parameter values can never be fully understood. It is important to recognize the tails of such distributions as well, for often a 50% probability of achieving $B_{40\%}$ is associated with a real (say 5 to 10% for example) probability of resulting in biomass levels below $B_{20\%}$. Ensuring that managers understand these risks is a critical task of stock assessment authors.[540]

In other words, the pollock ABC was set at the midpoint of the probability distribution curve and therefore had a 50-50 chance of being "right."[541] There is an equal risk of being "wrong" in the example above – i.e., overfishing, or fishing above the target ABC level. Although NMFS says that the stock assessment ABCs and TACs are "conservative" and take uncertainty into account, clearly a great deal of uncertainty remains unaccounted for in the model-generated ABC point estimate in this example. Given that the MSY-based "harvest policy" aims for a "target" stock size 60% lower than the average unfished size, the margin for error is small. Since the stock is expected to drop below the "target" stock size half the time, the margin for error is even smaller half the time. When uncertainties in the survey biomass estimates of stock size (on which the models are built) are factored in, along with uncertainties about the effects of predation mortality, environmental variability, observer error, etc., the risk of making mistakes is compounded.[542]

Leaving aside the issue of what such a harvest policy does to competing top predators whose overall prey base has been reduced below half on average, NMFS's official policy to set stock assessment ABCs based on a 50% probability of choosing the true F_{ABC} value is hardly precautionary, and not sustainable. The report must consider this uncertainty and explain how it is consistent with the assertion that there is "proper treatment of both observation and process uncertainty (statistical uncertainty), and the sensitivity of the assessment to a range of uncertainties (data selection and weighting, values of assumed parameters)." (p. 39).

PI 1.1.2.3.3: Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.

For the GOA assessment, the report states that sensitivities to model assumptions, parameters and data are undertaken and presented each year. The report states "The tendency is to select the 'best' model, but there is some evidence that they err on the side of caution." (p. 56). This sentence needs elaboration as it is

[539] John C. Field, A Review of the Theory, Application and Potential Ecological Consequences of $F_{40\%}$ Harvest Policies in the Northeast Pacific, p. 49. Prepared for the Alaska Oceans Network, November 2002. 101 pp.
[540] Id. at p. 50.
[541] NMFS 30 November 2000 FMP BiOp, Fig. 6.4.
[542] *See* Field at p. 49-53 for a discussion about "Error, Uncertainty, and Risk."

not clear what constitutes the "best" model or what evidence demonstrates that the SSC errs on the side of caution in selecting models for application of the tier rules to determine the ABC level.

The CIE review demonstrates the lack of sensitivity to assumptions in stock assessments regarding surveys:

In an earlier evaluation of the performance of various assessment models, one main conclusion was that quality input from scientific surveys was the best guarantee of quality output of assessment models (Anon 1998). Furthermore, a recommendation under the section titled '*New approaches' calls* to "*develop new means to estimate changes in average catchability, selectivity, and mortality over time, rather than assuming that these parameters remain constant".* This statement goes directly into the difficulties of pollock stock assessment. There is strong evidence of substantial ecosystem changes over time in the northern Pacific (Bailey 2000, Conners *et al.* 2002) and there is every reason to believe that
such changes may have a strong effect on the persistence and comparability of survey results over time. The influential effect on assessment by the factors discussed in the survey section needs to be evaluated under this perspective. This will directly affect how selectivity curves are estimated, and the use of survey estimates as absolute or relative values. There is good reason to believe that the major assumptions hold in most cases. However, when substantial changes in the ecosystem occur, this will also affect survey estimates, e.g. through distributional and behaviorural changes, and cause errors in evaluations of stock development trends. It is in these critical situations that assessment and management are in most urgent need of reliable survey data. There is thus a great need to study more carefully some of the major uncertainties, as listed under surveys. Such studies demand active interaction between survey scientists and assessment modellers. Based on the evaluation of the surveys, it is not unexpected that the violation of the basic assumptions may cause the observed contradictory trend in the survey assessments. In particular, such discrepancies are expected when changes in the ecosystem (e.g. regime shifts) take place with associated dynamics in vertical and horizontal distribution. Without a thorough knowledge of the dynamics connected to such ecosystem events the only way to improve quality of assessment seems to be to improve surveys along the lines suggested above (see also recommendations).

A peculiarity, not thoroughly discussed under the EIT survey, is the lack of old fish (age>8). This needs further attention as the fish are probably in the area and are recorded by the acoustics but not sampled by the trawls. The geographical variation in size also raises the question of geographical inconsistency (Wilson et al. 2000) or a habitat preference by size. The effect of regime shifts in the Bering Sea and the GOA is widely discussed. However, the shifts are difficult to take into account in assessment and management. If, as suggested, such shifts affect both the relationships used in the assessment models (e.g. stock recruitment relationships) and the performance and selectivity of surveys, more attention should be paid to taking these characteristics into account.

The same applies strongly to management issues. The calculated reference points are based on the data from the whole time series, while ideally only data belonging to each regime should be used. One example is the treatment of SSB-recruitment relationships. If such relationships change with regimes, a useful exercise could be to study the frequency of rich year-classes and recruitment levels in different periods (see e.g. Godø 2003). (CIE, p. 12).

This PI should be scored downward to the 60 SG level as there is not adequate consideration in stock assessments of sensitivities to assumptions.

PI 1.1.2.3.4.2: There is knowledge of the identity of stocks in the management area of the fishery.

The report notes on p. 57 that stock structure study results are not definitive with regard to clear stock boundaries, but that the Council's approach can be seen as broadly precautionary, and the management units correspond broadly to what is understood about spatial structuring of this species. The report also states that "within the broad management units there is evidence of identifiable and separate spawning areas. The GOA management area appears to correspond to a single stock." (p. 57).

The current stock assessment states:

The results of studies of stock structure in the Gulf of Alaska are equivocal. There is evidence from allozyme frequency and mtDNA that spawning populations in the northern part of the Gulf of Alaska (Prince William Sound and Middleton Island) may be genetically distinct from the Shelikof Strait spawning population. However significant variation in allozyme frequency was found between Prince William Sound samples in 1997 and 1998, indicating a lack of stability in genetic structure for this spawning population. Olsen et al. (2002) suggest that interannual genetic variation may be due to variable reproductive success, adult philopatry, source-sink population structure, or utilization of the same spawning areas by genetically distinct stocks with different spawning timing. Peak spawning at the two major spawning areas in the Gulf of Alaska occurs at different times. In the Shumagin Island area, peak spawning occurs between February 15 – March 1, while in Shelikof Strait peak spawning occurs between March 15 and April 1. It is unclear whether the difference in timing is genetic or caused by differing environmental conditions in the two areas.[543]

This indicates substantial uncertainty about the relationship, if any, between spawning stocks in the Shelikof Strait and elsewhere (Shumagin Islands, offshore areas, etc.). Thus, it seems there is little certainty about stock structure. The current management corresponds to a single stock yet it appears there is more than one stock. As such, this PI should be scored downward.

PI 1.1.2.3.4.3: There is knowledge of the life history characteristics of the species/stocks.
The report notes that extensive life history information has been collected for pollock since the late 1970s from fishery monitoring, resource surveys and targeted research studies and where appropriate, age and stock dependent life history parameters are incorporated in assessments. (p. 58). It recognizes that changes in productivity have been followed in several stocks, but the causes are not well understood. It also states that while efforts have been made to understand changes in the predation component of natural mortality, assessment models do not take account explicitly this information. (p. 58).

This PI should have had more rigorous scoring to reflect the important areas where there is lack of knowledge. Accordingly the team should score this PI downward and require a condition to address the lack of knowledge on changes in productivity and changes in the predation component and require incorporation of this information in stock assessment models.

PI 1.1.2.3.4.4: There is knowledge of the behavior (movement, migration, feeding, reproduction) of the stocks.
The report states on p. 59 that the knowledge of behavior and movement of pollock is sufficient to generally undertake robust assessments.

[543] M. Dorn et al, Assessment of Walleye Pollock in the Gulf of Alaska, NPFMC Gulf of Alaska SAFE, November 2003, p. 34 (citations omitted).

As noted in the CIE review, "information on the dynamics of distribution and migration is very limited and our knowledge of the stock structure is inconclusive." (CIE, p. 1).

The core area of GOA pollock is the region between longitude 130 W and 170 W within the shelf and slope of the Gulf of Alaska (Barbeaux *et al.* 2002). Several spawning areas are known within the area but their long-term importance for total recruitment is still uncertain. The Shelikof Strait spawning has been believed to be dominant but changes in distribution and abundance in recent years have cast uncertainty on its temporal stability. The fish spread out over the feeding area after a well-defined spawning period, which seems to vary significantly in time from one spawning area to another. A major uncertainty is related to the potential leakage or influx of biomass from the Bering Sea stock of pollock. An animation of catches over time shown by Jim Ianelli indicated dependences in the geographic distributions in the GOA and the Bering Sea. A leakage would barely be recognised in the much bigger stock of the Bering Sea, and would appear in the form of an unexpectedly high fishing mortality, similar to what has been experienced in recent years (Dorn *et al.* 2002). Further, the stock is regarded as being confined to the shelf and slope area although gadoids are known to spread out to pelagic areas, like pollock off the shelf break in the Bering Sea and blue whiting in the northeastern Atlantic (Heino *et al.* 2003). The stock unit issue seems to be unresolved on the basis of the available genetic studies (Bailey *et al.* 1999) and as stated by Kevin Bailey during talks, if a mass tagging method for pollock could be developed, this would probably be the best means of resolving the management unit problem. (CIE, p. 2-3).

The team should score this PI at the SG 60 level as "[u]ncertainty about the behavioral ecology of the species results in significant uncertainty in interpretations of data or in assessments of stock status."

<u>PI 1.1.2.3.4.5</u>: There is information necessary to measure trends in abundance of stocks.
The report notes the independent surveys done the GOA by NMFS and Alaska Department of Fish and Game. On p. 60, the report asserts that the "availability of fishery independent survey data based on rigorous survey design and using several sampling methods is one of the strengths of the assessment and management of these fisheries, and the score for this indicator reflects this." The report, however fails to support this statement to show the survey design is in fact rigorous and robust as required by the 80 SG level.

The CIE review provides significant information about the uncertainties in the surveys used to estimate pollock abundance. This includes the Alaska Fisheries Science Center (AFSC) bottom trawl survey, the echo integration trawl (EIT) survey and the Alaska Department of Fish and Game (ADFG) crab and demersal fish survey.

<u>AFSC bottom trawl survey</u>

"[T]here are several uncertainties related to [AFSC bottom trawl survey]'s ability to reflect true stock development." (CIE, p. 6). The following lists the most troubling assumptions about the GOA bottom trawl survey:

Assuming that we consider the estimates to be relative abundance estimates, there are two broad areas of assumptions. The first assumptions relate to the availability of fish to survey effort. These include:

1. Availability of fish (both overall and size/age classes) to survey effort does not change over time (e.g. no changes in depth distribution).
2. The use of different vessels and captains over time does not bias cpue observations.
3. The abundance and distribution of the surveyed species is similar in trawlable and untrawlable areas.
4. Movement patterns of fish during survey period do not change interannually.

The second group of assumptions relate to the ability of the gear to capture the available fish and these include:
1. Gear efficiency does not change due to interaction with physical variables such as depth/scope, substrate, or temperature.
2. Gear additions/modifications over time have had no effect on cpue observations.

If we were to assume that estimates were absolute abundance estimates (which we shouldn't), then a number of assumptions must be made, many of which we know not to be true, including:
1. No herding.
2. No escapement.
3. No fish in water column unavailable to gear.
4. Etc.

(CIE, p. 8, Box 1).

EIT survey

The CIE review also notes the assumptions in the echo integration trawl (EIT) survey:

Most important assumptions for the Gulf of Alaska walleye pollock pre-spawning acoustictrawl surveys: (the assumptions are NOT necessarily listed in the order of importance, although assumption #1 is the most important)
1) The amount of spawning pollock in Shelikof Strait represents a constant proportion of the Gulf of Alaska pollock biomass. This assumption has come into serious question during the last several years.
2) The model estimated selectivity curve is appropriate? I'm not certain that we miss such a relatively large proportion of older fish.
2) The current pollock target strength to fish length relationship (TS = 20 log L – 66) is appropriate for spawning pollock. The above relationship is largely based on
nocturnal distributions of non-spawning fish.
3) The current pollock TS to L relationship is appropriate for day *and* night
distributions of pollock.
4) The selectivity of the midwater trawl (and to a lesser degree the bottom trawl, since fewer bottom trawls are conducted) is the same for pollock of all sizes. This
includes mesh selectivity as well as selectivity from size (age) specific behavioral
responses (e.g., large fish exhibit more pronounced diving reaction).
5) Eulachon and pollock have the same TS to L relationship. Of course, this is not
true. But I do not believe that the relative contribution of euclachon in Shelikof
Strait is so great that this will have serious implications. Besides, we will apply a
eulachon TS to L relationship for this species during the next survey.
6) Nocturnal distributions of the subadult pollock, which form midwater layers, do not respond to underwater radiated noise from the survey vessel. The most recent buoy data suggest that SA values decline by about 20% based on an avoidance reaction (see my poster handout).
7) The proportion of fish within the dead zone remains constant among years. I am not certain about this assumption, but we can take a look at it. Of course, we will need to make some simplifying assumptions to apply dead zone corrections.

(CIE, p. 10, Box II).

The CIE review discusses the following issues regarding the EIT survey:

Acoustic dead zone: Pollock occupy the water column from the bottom well into the pelagic zone. There is always an uncertainty regarding the extent to which a substantial fraction of the biomass occupies the acoustic dead zone (the layer close to bottom outside the reach of the acoustic instruments (Ona and Mitson 1998)) and if the effect of this bias varies from survey to survey. Correcting for the dead zone for the whole time series can easily done and would form the basis for an evaluation of this problem.

Vertical distribution pattern: The acoustic survey gives a detailed vertical distribution of acoustic scattering. This information provides valuable ecosystem information and demonstrates near-bottom problems for the acoustic recording, the availability of pollock to the bottom trawl, diurnal migration dynamics, etc. Annual variations in vertical distribution profiles may thus change the absolute efficiency of the survey and the sampling efficiency of the sampling trawls. Vertical distribution profiles can easily be made for the time series and should be produced in order to evaluate changes over time (see e.g. Godø and Wespestad 1993).

Sampling errors (data scrutiny/survey selectivity/behavioural response):
The acoustic assessment methodology is susceptible to behavioural characteristics that affect the efficiencies of both acoustic and trawl gears. Diurnal characteristics disturb the day - night comparability of trawl catches (see e.g. Hjellvik et al 2002) as well as of acoustic recordings (Lawson and Rose 1999, Vidar Hellvik, Institute of Marine Research, unpublished data). Furthermore, species with escape reactions during trawling (Nunnalle 1991, Ona and Godø 1992), which GOA pollock presumably have (Wilson 2003), will be very susceptible to biased sampling. The lack of large fish in the survey as compared to assessment (Dorn et al. 2002) could reflect an inability of the trawls to catch large fish. If the large fish contribute substantially to the acoustic backscatters but are underrepresented in the trawls samples, the assessment will be substantially skewed towards small fish. This can easily be tested by using the selectivity curve from the stock assessment and adjusting the trawl catches before converting acoustic densities to fish abundance.

Data scrutiny and allocation of acoustic abundance to species is often a problem for acoustic surveys. In this case, the problem is mainly caused by the mixing of eulachon (*Thaleichthys pacificus)* and pollock. As eulachon has no swim bladder, it is very likely that the species can be separated using multi-frequency analysis (see Korneliussen and Ona 2002). To reach eulachon depths with the higher frequencies, noise reduction might be needed (Korneliussen 2000). Using frequencies of 38, 120 and 200 kHz would probably provide an adequate frequency response for improved species resolution.

As discussed above, the maturity at age information collected by the EIT survey displays unexpected variability. The opportunistic sampling strategy focus on representing different concentrations of fish and samples are therefore not distributed according to abundance. A correct representation can be obtained by weighting samples according to the abundance they represent.

Acoustic target strength: The acoustic target strength (TS) used for pollock is based on old field experiments. These measurements were from individuals during summer months, and the observations are probably not representative of the TS during the spawning season. There is a strong need for repeating the measurements with modern equipment and procedures (ICES 1999).

Following up the above considerations, future acoustic stock assessments will use direct *in situ* observations of TS instead of length frequencies from trawl catches as a basis for abundance estimation. For dense aggregations like those observed for pollock, it is necessary to lower a transducer to the fish to resolve fish into single individuals (see e.g. ICES 1999, Heino et al 2003). Such tests should be initiated now in an attempt to minimize the problems of trawl sampling. A major improvement could be obtained by measuring the TS of eulachon). This species mixes with pollock and is presently separated using a TS equal to that of capelin (Wilson et al. 2003). As this species lacks a swim bladder, the present approach probably causes a substantial overestimate, with a corresponding underestimate of pollock.

(CIE, p. 9-11).

<u>ADFG survey</u>

The CIE review also addresses the Alaska Fish and Game Crab and demersal fish survey.

The Alaska Fish and Game (AF&G) survey suffers from the same type of general uncertainty as the AFSC survey (see above). The use in assessment is further complicated by the difference in the timing of survey, trawl efficiency (von Szalay and Brown 2001, von Szalay in prep) and, most importantly, by the limited geographical coverage of the AF&G survey. The survey may give an indication of the variable importance of the inshore habitat, but it hardly represents a reliable index of the stock development as a whole. Due to the very different vertical sampling heights of the trawls, the two bottom trawl survey assessments cannot be reliably combined. The comparative trawling underlines the conclusion in the above section that the vertical distribution pattern is a major uncertainty of any bottom trawl survey coverage of Alaska pollock.

(CIE, p. 10).

In sum, the CIE review finds the following weaknesses regarding the surveys:

- The AFSC bottom trawl survey lacks vertical coverage and does not representatively cover the stock due to size dependent vertical distribution.
- The limited geographic coverage of the EIT survey makes it very susceptible to changes in the distribution of the stock.
- The bottom trawl survey gear uses an old fish trawl that is non-optimal for sampling purposes.
- No reliable recruitment indices are available from the AFSC bottom trawl survey due to the selectivity of the trawl and the lack of vertical coverage.
- The EIT survey bases the assessment on an old acoustic target strength, which was measured during feeding season.
- The bottom trawl used in both the NMFS and EIT surveys is highly size selective and changes in growth over time may cause inter-annual changes in catchability by size.
- The surveys are particularly susceptible to critical assumptions during periods of ecosystem instability (regime shifts) due to the gaps in geographic and vertical coverage.

The CIE review makes the following recommendation for survey improvements:

- Design and run a combined acoustic – bottom trawl survey during summer based on the 2003 survey experience. A simple logging of the acoustic data may give adequate results but a full integration of the two techniques is preferable, i.e. both the acoustic and the bottom trawl data are treated during the survey.
- Improve geographic coverage of spawning areas during the EIT survey.
- Establish *in situ* TS relevant for the mature pollock and for separation of eulachon in mixed recordings during the EIT survey (see also research priorities).
- Implement multi frequency data collection and analysis for species separation in the EIT survey.
- Improve or replace bottom sampling trawl with a less selective one. Such a replacement must be preceded by the needed gear and fish behaviour studies along the lines of those already done and planned at AFSC (see also research priorities).
- Produce routine information on vertical and horizontal distribution patterns from the EIT survey [ ].
- Correct for the acoustic dead zone.
- The AF&G crab and fish survey seems to represent limited additional information to the stock assessment and, if possible, activity should be transferred to strengthen the above items.

(CIE, p. 13).

In addition, this PI requires that there is information to measure trends and the analysis fails to demonstrate how the surveys are used to measure trends in abundance of stocks. As such there is a disconnect between the PI requirements and the analysis and the team should score this PI downward.

PI 1.1.2.3.4.6: There is knowledge of environmental influences on stock dynamics.
The report on p. 60 notes that there has been considerable research on environmental variability and longer-term "regime shifts" in both the Bering Sea and the Gulf of Alaska, including in relation to pollock productivity and dynamics. The report states that "the robustness of these assessments to uncertainties posed by short and longer term environmental variability has not been assessed. This issue is picked up in the conditions for certification under scoring indicator 1.1.1.5."

This PI has not been scored rigorously. The analysis admits that the stock assessments do not consider environmental availability. As such, it should score below 60 which states that "[e]nvironmental variability is largely ignored in assessments." In addition, while it is true that there has been some research on regime shifts and environmental variability, there has been no conclusive evidence regarding the role that regime shifts play regarding pollock populations.

In the North Pacific, the hypothesis that an environmental "regime shift" changed the food base in the North Pacific in the mid-1970s remains a popular and often-cited explanation for the crash of Steller sea lions and other ecosystem changes. For example, proponents of this theory have argued "that ecosystem change resulted primarily from variability in patterns of weather and climate, particularly as related to the Aleutian Low pressure system."[544] The most recent incarnation of this theory is the Oscillating Control Hypothesis of Hunt et al. (2002), who propose a mechanism for biological change based on the familiar distinction between "warm" and "cold" regimes in the North

[544] Report of the State of Alaska Steller Sea Lion Restoration Team, 2001, Appendix A.2, p. 93.

Pacific in an attempt to relate changes in fish, seabirds and marine mammals to decadal-scale climate variability.[545] In the "cold" regime, for instance, capelin and other nourishing fatty forage fishes are supposed to flourish, favoring top predators; in a "warm" regime, pollock, cod, salmon and flatfish are supposed to flourish, disadvantaging top predators.

We are concerned that the team has failed to analyze critically this key issue and improperly relies on NMFS information that is unsupported. For example, in the baseline analysis of marine mammals in the recent draft PSEIS, NMFS cites to Anderson and Piatt (1999) to make the case that regime shifts "*trigger community-level reorganizations of the marine biota*." (PSEIS I, 3,8-5). The quality of the data used in that study to draw this bold conclusion of ecosystem restructuring from decadal-scale climatic forcing is not discussed at all. In fact, the authors' rely solely on one limited data set of non-standardized data ADF&G nearshore shrimp trawl surveys in the west-central Gulf of Alaska from the 1950s to1990s. NMFS apparently is willing to take the data at face value without looking at other survey data, fishery catch records, and recruitment patterns of various species that do not readily support the strong claims of Anderson and Piatt. Apparently NMFS wishes to leave the strong impression that natural environmental forcing is responsible for the crash of Steller sea lions since the 1970s, along with fur seals, harbor seals, or any other species whose declines might otherwise be linked to overfishing and fishery habitat damages.

In a similar fashion, the PSEIS baseline analysis of the ecosystem (PSEIS I, 3.10) trods down the well-worn path leading to this perennial favorite fishing industry explanation for the crash of Steller sea lions and other observed changes in the marine ecosystems of the North Pacific since the 1970s, making frequent references to Francis and Hare (1994), McGowan et al. (1998), Piatt and Anderson (1996), Anderson and Piatt (1999), Trites et al. (1999) and a handful of other conjectural "regime shift" gray literature in support of a conclusion that "any effects of human activities on the marine environment should be considered in the context of the powerful physical forces that appear to be driving the BSAI and GOA ecosystems." (PSEIS I, 3.10-10). By clear implication, this suggests that any effects of fishing on sea lions or fur seals or pollock or crab are small by comparison to the powerful ecosystem-transforming effects of regime shifts, which all too often is fishery management's convenient excuse whenever an exploited stock fails to conform to the theoretical assumptions about MSY and plummets under fishing pressure.

Near the end of this climate-focused exposition of ecosystem change, the Fisheries Service concedes that correlations between climatic indices and ecosystem changes "have not been proven." (PSEIS I, 3.10-21). Nevertheless, NMFS hastens to add, climate-related changes in the physical environment "have been implicated." The Fisheries Service clearly wishes the public to believe that decadal-scale climatic "shifts" produce characteristic dominant fauna in the North Pacific defined by bipolar "cold" climate regimes (dominated by fatty forage fish/crustaceans/more marine mammals and birds) and "warm" climate regimes (dominated by gadids/salmon/flatfish/many fewer marine mammals and birds). The strong implication is that: 1) an oceanographic "regime shift" in the late 1970s triggered a massive ecosystem shift in dominant species in the North Pacific, leading 2) to plummeting crustaceans and fatty forage fishes and a new ecosystem structure dominated by "lean" fishes like pollock, leading presumably 3) to steep declines in some marine mammal and seabird populations as their preferred forage fishes like capelin or herring "disappeared," and the collapse of crustacean populations. In the baseline discussion on ecosystems (PSEIS I, 3.10), the Fisheries Service appears to endorse this hypothesis uncritically.

The Fisheries Service's attempt to explain away many species declines as a function of poorly understood "climatic forcing agents" relies heavily on preliminary ecosystem modeling exercises such as Trites et al. (1999) and Livingston and Jurado-Molina (1999) along with copious references to a bevy of conjectural regime shift scientific

[545] G.L. Hunt Jr. et al. Climate change and control of the southeastern Bering Sea pelagic ecosystem. Deep-Sea Research II 49 (2002): 582-5853.

papers and anecdotal reports from one individual observer in the 19th century (Veniaminov 1840) as the main lines of evidence to support the statement that, at any point in time, "some species are decreasing in abundance while others are declining." (PSEIS 3.10-1).

In conclusion, evidence from past and present observations and modeling studies at the community and ecosystem levels for the BSAI and GOA suggest that climate-driven processes are responsible for a large proportion of the multispecies and ecosystem-level changes that have been documented." (PSEIS I, 3.10-15 (emphasis added)).

Although NMFS leaves the strong impression that contemporary declines of species such as the Steller sea lion or northern fur seal are within the bounds of natural variability over historical time periods, NMFS tells us elsewhere throughout the document that there is little baseline trend information for most species. For instance, population trend data for most Alaskan seabirds were not collected before the 1977 "regime shift" and thus, "the effects on seabird populations can only be surmised." (PSEIS 1, 3.7-13). Likewise, little information is available on the fluctuations of Steller sea lion populations prior to the 1960s. (PSEIS I, 3.8-14). NMFS says that total and spawning biomass for BSAI and GOA forage fishes is unknown. (PSEIS II, 4.5-160). The actual condition of the eastern Bering Sea in the 1950s was uncertain because of the relative paucity of data from that time. (PSEIS I, 3.10-6).

The report should explain how one would know that the declines of top predators, regional pollock stocks, crab stocks, and other changes in the ecosystem in recent decades are within the historical range of natural variability for these ecosystems, given the above unknowns. The report should also reconcile the evidence from recovering U.S. West Coast pinniped populations indicating that periodic ENSO events can decimate a year class of pups while overall productivity remains high and populations are increasing. (Trillmich and Ono 1991). Thus it is entirely unclear how the latest incarnation of regime shift theory as proposed in the "Oscillating Control Hypothesis" by Hunt et al. (2002) – to take an example – would account for such extreme changes from top to bottom of the North Pacific food web since the 1960s and 1970s.

To make matters more confusing, no one seems to be sure if the mother of all regime shifts in 1977 may have ended in the late 1980s, or perhaps the late 1990s. Moreover, there is uncertainty as to which regime we are currently experiencing. For example, the agency cites evidence for a "minor" regime shift in 1988/89 and possibly the beginnings of another, larger change in 1998/99, and makes the prediction that yet another climatic regime is "likely to occur between 2000 and 2007." (PSEIS I, 3.3-10). Unfortunately NMFS does not tell us if this is going to be another warm, gadid-rich regime or a capelin- and herring-dominated "mature" regime resembling the 1950s Bering Sea as surmised by Trites et al. (1999) and Trites (2002).[546] (PSEIS I, 3.10-6). Although pollock are supposed to be favored by the "warm" regime of 1977, NMFS says that there has been above-normal sea ice cover in the Bering Sea since the 1970s regime shift – i.e., during a pollock-rich regime in the eastern Bering Sea. (PSEIS I, 3.3-11). To make this picture more confusing still, NMFS cites evidence of El Nino effects radiating north every three to seven years "to mask some of the synchronicity of changes in the physical and biological systems." (PSEIS I, 3.3-12). At the end of the day, no one seems to know what regime we might be in at the moment because any low-frequency signal from an average of December-May atmospheric pressure indices is swamped by extremes of variability in year-to-year ocean conditions.

The inability to recognize what regime we are in at any given point in time indicates that the effects of regime shifts – if they really exist at all – are weak, not strong. Year-to-year

[546] Andrew W. Trites, Predator-Prey Relationships, pp. 994-997. In: Encyclopedia of Marine Mammals, edited by W.F. Perrin, B. Wursig, and H.G. M. Thewissen. Academic Press, San Diego, 2002.

variability is where "bottom-up" oceanographic forcing seems to have the strongest influence on fish recruitment and fish population dynamics. Regularly occurring ENSO events (El Nino/La Nina) are examples of shorter-term environmental variability that can lead to very extreme differences in ocean conditions from one year to the next, sometimes with acute short-term effects on the reproductive success of marine mammals and birds but apparently without lasting adverse effects on the overall population trends of U.S. West Coast marine mammal top predators (Trillmich and Ono, ed. 1991). Given the variability in environmental conditions from year to year, how will decadal-scale average conditions change the composition of dominant fish species and the structure of marine ecosystems in the manner hypothesized for regime shifts? The Fisheries Service has elsewhere noted that scientists have not demonstrated a clear relationship between cycles of environmental change and productivity of individual fish populations.[547] In this draft PSEIS, that cautionary advice is all but lost.

NMFS' heavy-handed reference to regime shift theory completely overshadows other research from the Fisheries-Oceanography Coordinated Investigations (FOCI) program, for example, showing that annual oceanographic conditions influence pollock larval and juvenile survival (hence recruitment) at a variety of temporal scales ranging from weeks to months and occurring on spatial scales of tens to hundreds of kilometers. (PSEIS I, 3.3-9). These environmental factors interact with ecological variables such as predation, and together may have powerful effects on pollock recruitment (Bailey et al. 1996; Brodeur and Bailey 1996; Kendall et al. 1996; Macklin (ed.) 1998; Wespestad et al. 2000; Brander et al. 2001). Niebauer (1988) and Schumacher and Alexander (1999) have reported large interannual variations on the order of 40% around the mean sea ice cover in the eastern Bering Sea.[548] The extreme ups and downs of year-to-year environmental change would seem to explain in part why variability in recruitment impairs NMFS's ability to project stock trends with much certainty. (PSEIS I, 2-33). The take-home lesson from the available fish recruitment research seems to be that the dynamics of currents, mesoscale eddies, frontal boundaries of water masses, local-scale nutrient supplies, etc., are at least as important as the hypothesized effects of decadal-scale regime shifts, acting in concert with predation by other fishes, birds, and mammals and the added pressure of fishing mortality in recent decades.

By contrast, a "climate regime shift" is a low-frequency and subtle average difference gleaned from statistical averaging and smoothing of long time series of data from very selective indices such as the North Pacific Index (NPI), described by NMFS as "the area- and time-averaged sea level pressure anomalies in the region of 160^{0}E to 140^{0}W by 30^0 to 60^{0}N for winter to spring (December to May)." PSEIS I, 3.3-10. NMFS fails to explain how this low-frequency, long-term 1-millibar average difference in the strength of the Aleutian low (PSEIS I, 3.3-10), which is so subtle by comparison to the extremes of annual variability that it took more than a decade to recognize the pattern (PSEIS I, 3.3-11), will propagate through biological communities in such as way as to cause "the overall system…to stabilize periodically around two or more 'normal' states, changing from one to another abruptly in what has been termed a 'regime shift.'" (PSEIS I, 3.3-11). Rudnick and Davis (2003), for instance, showed that the apparent step-

[547] NMFS 30 November 2000 ESA Section 7 Consultation Steller sea lion BiOp on the BS/AI and GOA Fishery Management Plans, p. 132.

[548] James D. Schumacher and Vera Alexander. Variability and Role of the Physical Environment in the Bering Sea Ecosystem, pp. 147-160 *in*: Thomas R. Loughlin and Kiyotaka Ohtani (editors), Dynamics of the Bering Sea, University of Alaska Sea Grant College Program, Fairbanks, AK., AK-SG-99-03, 1999. 838 pp. "*In the Bering Sea, interannual variations in overall ice coverage, time of advection over the open shelf, and subsequent melt-back are among the most striking features of the physical environment… Observations of ice cover over the eastern Bering Sea shelf show a variation of nearly 40% about the mean (Niebauer 1988).*"

wise patterns of low-frequency changes detected by Hare and Francis (1994) and others in time series of atmospheric data from selective indices such as the NPI can be generated randomly in computer simulations, casting some doubt on the evidence that a meaningful "regime shift" between alternating ecosystem states occurred at all:

Using random independent time series generated to have the same frequency content as the PDO, we show that a composite analysis of climatic records recently used to identify regime shifts is likely to find them in Gaussian, red noise with stationary statistics. Detection of a shift by this procedure is not evidence of nonlinear processes leading to bi-stable behavior or any other meaningful regime shift.[549]

If decadal-scale average conditions do shift meaningfully in the bi-modal warm/cold manner described, it seems reasonable that some species will tend to be favored over others – on average, assuming that presumed environmental effects are not confounded with other ecological factors and fishing pressure – but many species also have life histories or geographic distributions that buffer them against such vagaries of environment. Moreover, the year to year variability in conditions is so extreme, particularly in these high-latitude marine ecosystems, that species presumably favored by colder conditions will enjoy some good years even in a warm regime, and vice versa. The fishing records from that era are empirical evidence that pollock were very abundant in the Bering Sea in the 1960s and early 1970s, for instance*, prior* to the 1977 regime shift.

Why were there so many pollock in the eastern Bering Sea during the supposedly low-pollock regime, as surmised by Trites et al. (1999)? Why did Gulf of Alaska, Aleutian Basin and Aleutian Islands pollock abundance plummet during the supposedly high-pollock regime of the 1980s? If a regime shift was responsible for the crash of crustaceans in the Gulf of Alaska, as proposed by Anderson and Piatt (1999), why did the collapse of shrimp around Kodiak Island and the Alaska Peninsula occur in a serial pattern as the fishery moved from one fishing ground to the next, as documented by Orensanz et al. (1998)? Why did the Gulf of Alaska red king crab fishery crash at the end of the 1960s after a decade of record catches there, and not after 1977 as in the eastern Bering Sea (NRC 1996)?[550] Why did red king crab in the eastern Bering Sea crash around 1980 after a decade of record catches there, but first Tanner and then snow crab continued to support a large crab fishery through the 1990s before crashing in rapid succession in the most recent times? Even if climate and oceanography were responsible for their successional declines, and not rampant serial overfishing, why were the declines not synchronous with the timeline for the 1977 regime shift? If herring was a dominant fish species and preferred prey of top predators during the "cold" regime of the 1950s (Trites et al. 1999; Trites 2002), why do herring recruitments consistently show strong years classes originating in "warm" years, regardless of regime?[551]

We are troubled by any claim that the $F_{40\%}$ policy and its assumptions about density-dependent stock productivity at $B_{40\%}$ are consistent with the countervailing claim throughout the draft report that density-independent extrinsic environmental forces are driving species populations and productivity. We have seen that as long as fishery yields remain robust, NMFS takes credit for managing conservatively by the rules of the $F_{40\%}$ policy, but if a stock fails to equilibrate around the lower $B_{40\%}$ target stock biomass assumed by this theory and plummets under fishing pressure, the agency blames the weather. There is no accountability in such a management system.

PI 1.1.2.3.5.1: All major sources of fishing mortality for the stocks are measured and accounted for.

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549 Daniel L. Rudnick and Russ E. Davis. Red noise and regime shifts. Deep-Sea Research I, 50 (2003): 691-699.
550 National Research Council. The Bering Sea Ecosystem. National Academy Press, 1996. See pp. 74-77, Fig. 4.3, for red king crab discussion and fishery catch trends.
551 National Research Council. The Bering Sea Ecosystem. National Academy Press, 1996. See p. 104, Fig. 4.24,25, for herring discussion and recruitment trends. "It is interesting to note that the three largest year classes appear in 1957, 1958, and 1977, years of significant pulse warming in the eastern Bering Sea."

The report states that there is a high standard for observation and recording catches, with 30% at-sea observer coverage of much of the GOA pollock fleet. (p. 61). The report also states that there is very little bycatch of pollock in other fisheries and these appear to be adequately monitored. (p. 61). The report notes that MRAG Americas reviewed the North Pacific Groundfish Observer Program in 2000 that found the program to be generally performing well but recommended improvements. (p. 61).

The analysis fails to consider all sources of fishing mortality, including predation and ghost fishing. Requiring consideration of all sources of mortality is necessary to manage the fishery on an ecosystem basis. In addition, while the bycatch of pollock may be low as a percentage of total catch, it is very large in volume, especially compared to the directed catch of fisheries in other regions. This fact should be noted.

Further, the report fails to note the findings of the MRAG review regarding the problems at the 30 percent coverage level. The report fails to note that there are no observers on boats under 60 feet. At best there is an observer 30 percent of the time on vessels from 60 feet to 125 feet. Regarding coverage of vessels in the 30% coverage category, and independent review by MRAG Americas found that observer coverage is not random at the vessel level that has the potential to introduce unknown bias into the dataset. The MRAG review cited a high likelihood of differences in vessel behavior between observed and non-observed vessel days, both in terms of fishing patterns and compliance with management measures. The review also found that the 30% coverage level may not provide enough spatial and/or temporal coverage for special scientific programs (e.g., otoliths, stomach contents sampling for ecosystem studies). To address the concerns with the smaller boats and less observer coverage, the management should require 100% observer coverage on vessels greater than 60 feet and 30% observer coverage on vessels less than 60 feet.

PI 1.1.2.3.5.2: The age and/or size structure of catches are measured.

The report states that generally comprehensive data are available for the GOA fisheries on the age and size structure of commercial catches, surveys, and the observer program. (p. 62). Also, the report notes that observer coverage for the GOA fishery is at the 30% level for larger vessels and that should “ensure adequate statistical sampling of the catch.” (p. 62). More information should support this scant discussion for this PI. For example, the report should discuss the percentage of the pollock catch that is measured for age and size and support how the 30% coverage provides adequate statistical sampling.

The CIE review on GOA pollock addressed whether the current age data is sufficient. The review notes that some key issues include:

1. Is the number of otoliths for age determination large enough to ensure correct year class representation mean size by age?
The response to this question was that all statistical analyses carried out so far have shown that the samples requested are adequate. Some problems might occur in the commercial fisheries to cover all gears, areas and time-slots in the sampling scheme. There is no evidence that this represents a significant problem in the assessment. Due to the low numbers aged, I still think this issue needs further consideration.

2. Can more information be extracted from the otolith readings, e.g. age at first spawning?
Otoliths and fish scales resemble a time-environment recorder for fish. All important events in the life cycle are logged, but they are not always easy for the reader to detect. For several gadoid and clupeid stocks in the northeast Atlantic, the age at first spawning and shift in geographic location over time can be determined on the basis of changes in the zone structure of the otoliths or scales (Rollefsen 1931, 1933, Runnstrøm 1936, Engelhard et al. 2003). Similar features might also possibly be found in pollock otoliths after the

introduction of the break and burn technique. If age at first spawning could be determined it would help to resolve the problem of variability in maturity at age. A change in habitat from the Bering Sea to GOA might also be detectable as a change in the zone pattern due to the area difference in temperature. Histological studies of the sampled
gonads have shown that studies of ovulatory follicles and gonad wall thickness may provide additional information on maturation dynamics (see also section above).

3. Can the effect of unreliable readings and discard of unreadable otoliths be reduced?
The complexity and uncertainty of otolith readings increase with age with the result that in some cases, otoliths have to be discarded as unreadable. In most cases, this eliminates information about larger and older fish and thus biases small samples. To minimise the effect of this problem in assessment, a new routine has been introduced for Norwegian spring spawning herring. Instead of discarding the difficult age samples, the readers are asked to determine the minimum age of the fish leaving the assessment, with the possibility of doing the assessment with the group, which often takes place anyway (Ingolf Røttingen, Institute of Marine Research, personal communication).

(CIE, p. 5-6).

The CIE review includes the following recommendations regarding age data:
• Combine information from histological studies of gonads with otolith structures in order to find out whether otoliths can be used to determine age at first spawning and possible immigration and emigration.
• Reduce discard of otoliths through introduction of reading minimum age

Further, the report fails to note that there are no observers on boats under 60 feet. See the discussion for PI 1.1.2.3.5.1 regarding the MRAG Americas review and the problems identified at the 30 percent coverage level. In addition, the report should discuss what comprises the "comprehensive data" upon which you rely in scoring this PI above 80. Without supporting information, this PI should be scored lower.

PI 1.1.2.3.5.3: Fishing methods and patterns are well understood and recorded.
The report provides that "[s]patial patterns of fishing and selectivities of gear are well understood and measured for all US fleets significantly affecting the stocks. Moreover, selectivities of commercial and survey gear appear to be well estimated in assessments." (p. 67 (citations omitted)). These are conclusory sentences without support. More information is necessary to demonstrate that these statements are accurate. Without additional supporting information, this PI should be scored lower.

Further, there is no discussion about the specific methods of fishing in the GOA pollock fishery. The GOA pollock fleet use both bottom trawl and so-called pelagic trawl gear. The report should discuss the differences between these gears, including their selectivities.

PI 1.2.1: There is formal and comprehensive monitoring of catches of by-product species in this fishery.
On p. 68, the report states that bycatch rates are "very low in the GOA fishery." (p. 64). The report also notes that the Observer Program records data on all significant by-catch species for the primary pollock fleets and finds that by international standards, the observer coverage and sampling is very good. (p. 64). The report states that the MRAG Americas review "raised several concerns about the non-random selection of vessels for at sea observation in the vessel size range 60 to 125 feet, where there is 30% observer coverage." (p. 64).

The report fails to discuss the fact that there is very differing level of observer coverage in the GOA fishery. Coverage ranges from none for vessels under sixty feet to 30% for vessels sixty to 125 feet. Also, the report fails to discuss the different trawl gears used to prosecute GOA pollock – bottom trawl and pelagic trawl.

The report also fails to describe the monitoring system of bycatch species that occurs. The 80 SG requires that a "statistically robust catch sampling program provides estimates of catches of all by-product species." There is no discussion of the how the sampling program may be "statistically robust." An area of concern is where within the net, the observer is sampling. Samples are frequently collected from only the beginning and/or end of the codend of the trawl net. If the codend has fish stratified, the observers may be biasing the data toward too little or too much bycatch. In addition, there is no clear protocol regarding observer sampling in the front section of the net upper meshes where bycatch species stay and do not make it into the codend of the trawl net. Therefore, there is inconsistent sampling of this area of the net – some observers monitor and some do not.

In addition, the SG requires that the amount of *all* bycatch species be estimated. As noted, only "significant" bycatch species (Pacific cod, halibut, five other flatfish, herring and salmon) are recorded. For most non-commercial species, the vast majority of species in the North Pacific, there are no established limits of any kind on incidental catch. For non-target species in the FMP categories of "Other," "Forage Fish," and "Non-specified" species, the species-level information provided by the Observer Program is extremely limited. For instance, the observer database includes records of HAPC (habitat areas of particular concern) biota bycatch of corals, but no taxonomic identification by family, genera or species.[552] Most species in the FMPs' "Non-specified" category (e.g., snails, bivalves, ascidians, corals, sponges, urchins, anemones, tunicates, as well as most of the families of fishes that comprise the groundfish assemblage) are not monitored at all, even though they may play important ecological roles as food and living substrate for managed species. In addition, the North Pacific Groundfish Observer Program is not designed or adequately funded to provide such detailed information on the composition of the catch. Under the current Observer Program, observers have limited time or training to devote to the identification of many taxa to the species level that appear as bycatch in fishing gear from these categories (e.g., skates, sculpins, squid, or octopus), in addition to the fact that "other" (i.e., non-commercial) species are a low management priority. At best, the Observer Program strives to achieve statutory objectives for accurate enumeration of the target species, prohibited species, and total catch measurement.

This PI should be scored downward to reflect that not all bycatch species are estimated. The team should require that PSC limits be established for currently designated HAPC living habitat such as corals, and PSC limits should be set for all future HAPC designations. In addition, species-specific bycatch limits should be established for non-target stocks such as squid, octopus, skates, sharks, grenadiers, and sculpins as sufficient information on these species becomes available. Also, it should be noted that the bycatch rates may be low, but the volume is still significant when compared to other directed fisheries outside Alaska.

<u>PI 1.2.3</u>: There are strategies to control catches of significant by-product species in the pollock fishery.
On p. 65, the report states that strategies to address bycatch in the GOA include specific caps on take of by-product species, based on assessments of those species.

The report fails to note the serious limitation of the PSC/bycatch cap system. These include:

1. The information is expensive to acquire on a regular and timely basis, and is subject to large error bounds.

[552] NPFMC, Draft HAPC EA/RIR 1999.

2. The caps are only effective if biological assumptions and species abundance indices correspond to real conditions.
3. The caps are only effective with high levels of observer coverage and thorough sampling of the catch.
4. The caps do not account for the uncounted crustaceans, mollusks, and other benthic life that are crushed or maimed by trawl gear and left on the seabed, and therefore they understate the full impacts.
5. Bycatch caps provide no protection to seabed habitat from trawl gear disturbance and damage.

PI 2.1.1: Rules for setting TACs at low stock sizes promote recovery within reasonable time frames.
The report notes that there are little demonstrated empirical evidence or simulation results to suggest whether reducing exploitation rates for Tiers 1-3 is adequate to promote rapid recovery. (p. 66). While theoretical results assume resilience and rapid recovery, empirical evidence for the Bogoslof area and the "donut hole" suggest very slow recovery rates once stocks are depleted. Thus, the team imposed the condition that the fishery must meet the same conditions that are required under indicator 1.1.1.5. Please refer to the comments provided for PI 1.1.1.5. The report fails to note that despite the fact that the GOA pollock stock is below MSY, the Council has increased the catch level 31%. Clearly, the management is failing to reduce exploitation rates at the low stock size.

These comments discuss previously the lack of responsiveness with the overfishing definitions under the HCRs. Under the HCR prior to the recent sea lion protection measure to stop fishing once the GOA pollock stock reaches B_{20}, stocks or stock "complexes" in the North Pacific can be fished as low as 5% of $B_{40\%}$ (proxy B_{MSY}), or about 2% of the theoretical unfished, equilibrium spawning stock biomass, before NMFS will require fishing to stop on those stocks. This level is too low to promote recovery within reasonable time frames.

PI 2.1.2.1: There is a specific recovery plan in place including measures other than TAC reductions.
The report notes that management tools other than TACs clearly exist and are used, but their use is not explicitly linked to recovery plans. (p. 67). This discussion includes the following puzzling statement:: "In retrospect, the evaluation team considers that, while it is clearly sensible to consider a range of responses to stock depletion, prescribed responses other than catch reductions may be problematic. This indicator is therefore given an 80 passing score based on empirical evidence of past responses." (p. 67). There is no elaboration, however as to why prescribed responses other than catch reductions may be problematic. In fact, there is no specific recovery plan in place that includes any measures to rebuild populations. To date, all management actions taken to address depleted populations (Bogoslof Island and Aleutian Islands) have been ad hoc and have not followed any well-thought out plan developed in advance of the stocks' decline. The team fails to demonstrate that the fishery scores greater than 80 SG on this PI and as such, the score should be reduced to the 60 scoring level.

PI 3.1.1: The age, sex and genetic structure of the stocks are monitored.
The report finds that monitoring of age and sex structure appears to be more than adequate to detect threats to reproductive capacity. (p.68). The team dismisses the concerns about the fisheries relying on a few age classes as a function of the patterns of recruitment variability rather than a clear impact of fishing.

The report fails to note that over time steady fishing pressure changes the age structure of exploited stocks, reducing the average age as well as the average length and weight of pollock populations significantly. This occurs because the fishery selectively and repeatedly targets age-5+ pollock and increases the mortality on those age groups above the natural mortality rate, thus culling the older fish from the population and reducing their abundance substantially (40-60%) over time:
The reduction in abundance that occurs as a result of commercial fishing is not uniform across all ages. Direct fishing mortality on juvenile pollock is low and their abundance is only affected by fishing indirectly through the stock-recruitment relationship. . . . For early adult pollock (ages 5-9), which make up the bulk of

the catch, mean abundance is reduced by 40-60% from unfished levels due to direct mortality. For the late adults (age 10+), mean abundance is reduced to less than 10% of unfished levels due to the large cumulative mortality since becoming vulnerable to fishing gear.[553]

Evidence from the past suggests that the pollock fishery substantially reduced the average age, size, weight, and abundance of pollock in the Bering Sea in the 1970s (Lowry *et al*. 1988) and in the Gulf of Alaska in the 1980s (Calkins and Goodwin 1988). For instance, Lowry *et al*. (1988) cited fisheries statistics from the 1970s indicating that the intense foreign pollock fishery of the early 1970s rapidly reduced the abundance of older pollock in the Bering Sea, as well as the average size of pollock in the population:

Based on cohort analysis, the exploitable biomass (ages 2-9) in the Bering Sea increased in the 1960s, peaked in the early 1970s, then declined in the mid-1970s. Part of the cause of this decline was "the accumulative removals by the fishery in 1970-75 (which totaled 9.6 million t). (Bakkala et al., 1987). The catch-per-unit-effort in the fishery and by research vessels dropped by a factor of more than 3 from the late 1960s to the mid-1970s, and the average length of pollock caught dropped from 42-44 cm to 35 cm (Pereyra et al., 1976). Based on this change in lengths, the projected mean weight of fishes would have declined by about 45%.[554]

The November 2000 Steller sea lion FMP-level Biological Opinion conducted an analysis of fished and unfished populations in the North Pacific using a conventional single-species model and MSY equilibrium assumptions and found that the "average" eastern Bering Sea pollock is more than a year younger and weighs 30% less under the $F_{40\%}$ exploitation strategy employed by the North Pacific Council.[555] This "juvenation" of the stock over time will have large impacts on egg production:

Commercial fishing increases the total mortality of the exploited population, and will result in significant demographic changes, including a reduction in reproductive output. . . . There is a 9% increase in eggs/kg body weight for age-15 pollock relative to age-4 pollock. . . . For an F40% harvest rate, where female spawning biomass per recruit is reduced to 40% of unfished, the egg production per recruit was reduced to 39% of unfished egg production.[556]

This fishing strategy not only changes the age structure and egg-bearing potential of the exploited pollock population over time, it is also likely to change the relative geographic distribution of the pollock stock, reflecting the habitat preferences of younger-aged fish: "Since the late adults are disproportionately reduced in the abundance by fishing, the areas occupied by them would show a far greater decline in mean fish density than areas occupied by younger adults."[557]

Furthermore, these cumulative effects on age structure, size and distribution of exploited pollock stocks should also be expected to have substantial impacts on the other consumers of pollock in the ecosystem:

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[553] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 12, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .

[554] Lloyd F. Lowry, Kathryn J. Frost, and Thomas R. Loughlin. Importance of Walleye Pollock in the Diets of Marine Mammals in the Gulf of Alaska and Bering Sea, and Implications for Fishery Management. Proceedings of the International Symposium on the Biology and Management of Walleye Pollock, November 1988. Alaska Sea Grant Report 89-1. June 1989.

[555] NMFS November 2000 FMP BiOp, p. 226.

[556] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 11, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .

[557] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.7, p. 13, re: reproductive and distributional effects of fishing-induced changes in age structure of pollock .

Fishing does, however, reduce the number of spawning fish, and the number of fertilized eggs, larvae, and juvenile fish produced. In an equilibrium single-species context, “recruitment” to the fished population may be unaffected in the long-term by removal of 60% of the female spawning biomass. From this perspective, this was “surplus” production. On the other hand, from the perspective of other predators of fish, a long-term equilibrium reduction in spawners, larvae and juveniles is likely since the “surplus” went to them.[558]

Lowry *et al*. (1988) and Calkins and Goodwin (1988) both suggested that fishing-induced reductions in average age, size as well as overall availability of pollock could have had deleterious impacts on Steller sea lion nutrition. For instance, Calkins and Goodwin (1988) observed that the sizes of pollock eaten by sea lions near Kodiak Island in 1985/86 during the massive but short-lived Shelikof Strait roe pollock fishery were significantly smaller than during 1975-76, when the fishery was just starting to expand. They estimated the average weight of pollock eaten by sea lions in the 1970s to be 148g compared to 93g in the 1980s data.[559] This suggests that sea lions would have to work harder and eat more of the smaller pollock to get the same amount of calories (energy) contained in older, larger fish.

Further, the recent stock assessment provides the following regarding genetic structure uncertainty:

There is evidence from allozyme frequency and mtDNA that spawning populations in the northern part of the Gulf of Alaska (Prince William Sound and Middleton Island) may be genetically distinct from the Shelikof Strait spawning population. However significant variation in allozyme frequency was found between Prince William Sound samples in 1997 and 1998, indicating a lack of stability in genetic structure for this spawning population. Olsen et al. (2002) suggest that interannual genetic variation may be due to variable reproductive success, adult philopatry, source-sink population structure, or utilization of the same spawning areas by genetically distinct stocks with different spawning timing. Peak spawning at the two major spawning areas in the Gulf of Alaska occurs at different times. In the Shumagin Island area, peak spawning occurs between February 15 – March 1, while in Shelikof Strait peak spawning occurs between March 15 and April 1. It is unclear whether the difference in timing is genetic or caused by differing environmental conditions in the two areas.[560]

As demonstrated above, there is considerable uncertainty regarding the age, sex and gender structure and this PI should be scored downward.

<u>PI 3.1.2</u>: There is knowledge of the dynamics of sex structure in the species.
The report states that there no obvious complexities in sex structure for this species, there is comprehensive monitoring, and there are no current threats to reproductive capacity due to changes in sex structure. (p. 69). The report does not elaborate on what the comprehensive monitoring involves regarding the sex structure of the species. In addition, the report fails to address the research by Hinckley (1987), though limited, indicated that female pollock specimens in the 40-45 cm size range (corresponding to age-4/5 fish) produced roughly 100,000-130,000 eggs per fish, whereas females in the 60 cm size range (perhaps age 10+) produced 500,000-600,000 eggs per fish and females in the 65-75 cm size range produced 1,000,000 eggs or more.[561] These specimens were not aged, the

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[558] Administrative Record to the November 2000 Steller sea lion FMP-level Biological Opinion, Supplement #6, S6-160, 10-11-00, NMFS/AKC Analytical Team Biological Opinion Question 5.10, p. 18, re: F40% effects on carrying capacity of predators.

[559] D. Calkins and E. Goodwin. Investigation of the decline of Steller sea lions in the Gulf of Alaska. Final Report to NMFS, NMML Contract No. NA-85-ABH-00029, 1988. 76 pp.

[560] M. Dorn et al, Assessment of Walleye Pollock in the Gulf of Alaska, NPFMC Gulf of Alaska SAFE, November 2003, p. 34 (citations omitted).

[561] Sarah Hinckley, The Reproductive Biology of Walleye Pollock, Theragra chalcogramma, in the Bering Sea, with Reference to Spawning Stock Structure. Fishery Bulletin Vol. 85(3), 1987: 481-498. See pp. 491-493, Fig. 6.

sample sizes were small, and egg production may vary widely from year to year or region to region. Given those caveats, the data suggest that older, bigger pollock can produce anywhere between 5-10 times more eggs than females at early maturity (age 4 or 5).[562] However, few fish live beyond age five because they are targeted by the fishery. Also, the report fails to discuss whether the fishery's targeting of spawning females impacts the overall sex structure of the stocks. Thus, the report should require research into whether there is less egg production due to the impacts of fishing and the impacts of targeting spawning pollock on the stocks.

PI 3.1.3: Information from stock assessment does not indicate problems with reproductive capacity (spawning stock and recruitment).

The report finds that the GOA stock "has exhibited a long term decline in spawning stock levels" but "the reasons for this may be complex, and partly due to natural environmental cycles." (p. 69). The team requires the same condition for this PI as for PI 1.1.2.1.

Please see our comments under PI 1.1.2.1.

B. MSC PRINCIPLE 2

Principle 2 states: "Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends." The GOA pollock fishery fails to meet Principle 2 and the Criteria and Performance Indicators that are associated with it. Despite the massive removal of pollock biomass from the North Pacific, the agency has failed to manage the pollock fisheries from an ecosystem perspective and does not proactively avoid or even address the impacts of the fisheries on the Gulf of Alaska environment. Instead the agency employs single species management of the target stocks, justifying the catch levels on the notion that the fisheries are catching "surplus pollock" which otherwise would be wasted. The agency and Council have failed to consider adequately pollock's pivotal role in the marine food web in setting ABC and TAC levels for the fisheries.

Only when forced by a court of law has the management attempted to take any steps to curb the pollock fisheries' impacts on the endangered Steller sea lions. Moreover, many of these reactionary management actions have been found to be legally insufficient. Until the agency manages the pollock fisheries with the ecosystem in mind by greatly reducing catch levels and instituting area and/or gear closures to ensure that sufficient pollock biomass remains in the marine environment for other consumers, the Alaska pollock fisheries will continue to be prosecuted in a manner that is not sustainable for the North Pacific marine ecosystems.

1. Issues in the Introductory Narrative

In the Introductory section for Principle 2 under "Pollock Abundance" on p. 75, the report states

Pollock abundance in the GOA has declined considerably during the last 30 years. It is now at a level considered by NMFS to be about 29% of the model-predicted biomass in unfished conditions (2003 SAFE document for GOA pollock. However, evidence suggests that much of this decrease can be attributed to

[562] Studies of egg production in North Atlantic cod also confirm that bigger, older females produce vastly more eggs per fish.

environmental conditions rather than to the effect of the pollock fishery (for more details see text under MSC Principle 1).

As described under Principle 1, PI 1.1.2.1, we disagree with your evaluation that the low GOA pollock abundance is caused by environmental variability. Instead you should characterize this stock as overfished because its abundance is below MSY as required by the Magnuson Stevens Act. Regardless of the cause of the low biomass levels, the GOA pollock stock should be managed in a very precautionary manner. This is not occurring as evidenced by the Council's recent decision to *increase* the harvest level by 31 percent, despite the fact the biomass has declined significantly over the last 30 years.

Under the "Steller sea lion declines" section on p. 75, the report states that "Recent studies of SSL diet around Kodiak Island suggest that Pollock is now only 4th rank in SSL diet after sandlance, arrowtooth flounder and Pacific cod (Wynne, Foy, Norcross, Hills and Buck, unpublished data). Given the low level of Pollock stock in the last few years, such diet switching is to be expected." Any conclusions about the importance of pollock in the diet of Steller sea lions in the GOA because of diet switching should be qualified. The results of the Kodiak Island studies are preliminary and localized to that area.

2. Problems with Principle 2 PIs

The following are comments on the PIs and conditions associated with MSC Principle 2.

PI 1.1: There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.
The report correctly recognizes a number of issues under this PI. We agree strongly with the following statements:

Given the importance of pollock as the primary food for many "top predators" in this ecosystem, we consider that an ecosystem approach is especially important for this fishery (more so than for example in fisheries for other gadoid species that form a small part of the diet of wildlife where the 'food fish' of top predators tends to be gadoid prey rather than the gadoid stock itself). Thus we consider the ecological role of pollock to be more similar to that of capelin in the Barents Sea, sandeel in the North Sea, krill in the Southern Ocean, than to the role of cod in the Barents Sea, cod, haddock, whiting and saithe in the North Sea, or hoki in New Zealand. (p. 78).

"What may be conservative in terms of avoiding depletion of spawning stock biomass and impacts on future recruitment may not necessarily be conservative in ensuring adequate densities of food fish for foraging dependent predators". (p. 79).

" . . . as the pollock fishery has not yet used the Ecosystems Considerations chapter in determining ABCs, an important step in setting the annual catch." (p. 80).

"Efforts to avoid possible local depletion in areas of particular importance for foraging marine mammals (Steller sea lions in particular) have been of uncertain efficacy, and it appears have done rather little to reduce the very high proportion of pollock catch taken from defined 'critical habitat' of Steller sea lions. Given the potential influence of the pollock fishery on Steller sea lion prey fields, and the fact that ongoing studies have not yet provided a firm understanding, the management appears not to be as precautionary as one might expect in a position of continued uncertainty." (p. 80).

The team requires the following condition to improve the deficiencies in performance for this PI:

[T]he fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries. The plan must show how the authors of the "Ecosystem Considerations" chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures. (p. 82).

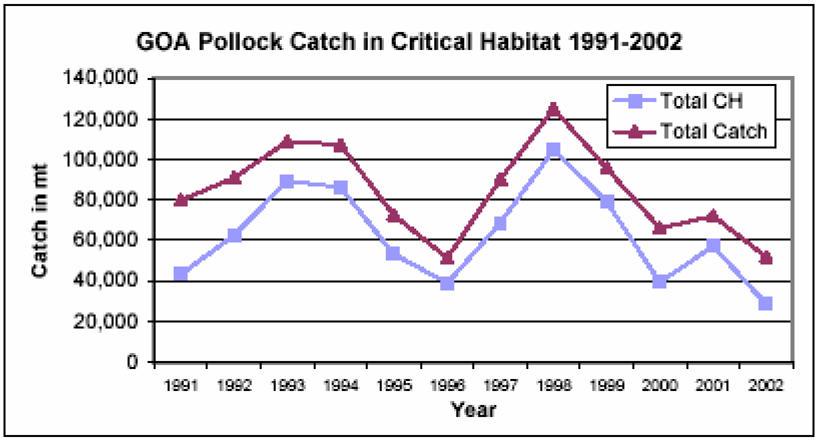
This condition includes no timeline for achieving this requirement for ongoing certification. As a number of species are declining in the region where pollock fishing occurs, complying with this condition to adapt ABCs to expressly include ecosystem considerations within a short time period is very important. Thus, this condition should require that the plan for incorporating this information be developed within three months and implemented before the next fishing seasons' TAC specification process occurs.

In addition, this condition should require that stocks managed in Tiers 1-3 to set the target fishing rate at $F_{75\%}$ as an ecosystem proxy and set MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics) for important target prey species such as pollock. In addition, there must be explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species and habitats. Stocks managed in Tiers 4-6 for which there is not adequate information to estimate biological reference points (BRPs) and minimum stock size threshold (MSST), should have no directed fishery TAC specified until data is available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Stocks managed Tiers 4-6 should be designated as bycatch-only status and require full retention and utilization of bycatch species in Tiers 4-6 to improve target species management by improved data collection.

PI 1.2.1: Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.

Regarding Steller sea lion habitat, the report notes that "[e]ven with ongoing studies to assess pollock prey fields in SSLCH more fully, the effects of harvesting from SSL 'critical habitat' on fish prey fields are not yet known." (p. 84). The report contains the following Figure 2.1(b) that illustrates that the pollock harvest within critical habitat has been increasing and asserts that "the continued high harvest from SSLCH seems less than precautionary, and provides a strong case for more and continued detailed research" to test the hypotheses associated with the availability of pollock in SSLCH. (p. 86).

Figure 2.1 (b). GOA Pollock catch in SSLCH 1991-2002 (from NMFS, 2003).



In addition, the report states that there is a lack of assessment of impacts of lost gear on habitat. (p. 86).

Also, the report voices concern about the discards contributing a significant food source for scavenging seabirds:

Although rates of discarding from the pollock fisheries are low compared to those in many other fisheries, and can reasonably be assumed to have a negligible effect on benthic habitats and communities, the extent to which the provision of discards as a novel food supply for scavenging seabirds alters their habitat, behavior and spatial distribution, has apparently not been assessed in the GOA. While a discarding rate of only ca 1-2% of total catch is exemplary, this represented over 1,000 t of fish discarded each year 1998-2000. This is not a trivial amount of food to be providing to scavenging marine animals. (p. 86) (citations omitted).

To improve the concerns above, the team requires the following condition:

- Provide a thorough written review of the state of knowledge of the impact of pollock fishing on SSLCH and on the relevance of the SSLCH concept, in order to focus future research onto key unknown questions. These will probably include the question of defining critical habitat for foraging Steller sea lions as opposed to critical habitat where disturbance to resting or breeding animals should be constrained.
- Provide a thorough written review of gear loss from pollock fishers and its potential impacts on habitats.
- Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds.
- Develop and implement research programs to provide the missing information identified in 1-3 above required to identify whether the fishery has adverse effects on habitats through gear loss or through enhancing local food supply to scavenging seabirds.

THE AREAS SPECIFIED IN THE CONDITION ARE IMPORTANT AND WORTH ATTENTION. WHILE WRITTEN REVIEWS ARE HELPFUL TO UNDERSTAND THE CURRENT STATE OF KNOWLEDGE ON THE SPECIFIED SUBJECTS, THEY ARE NOT ADEQUATE TO CORRECT THE DEFICIENCIES IN THIS PI BECAUSE THEY FAIL TO REQUIRE ACTION RELATED TO THE PI'S REQUIREMENTS. AFTER THE WRITTEN REVIEWS ARE COMPLETE AND RESEARCH PROGRAMS ARE DEVELOPED AND IMPLEMENTED TO IDENTIFY THE MISSING INFORMATION, THEN ACTION NEEDS TO BE TAKEN ON THE OUTCOMES OF THE RESEARCH. THE CONDITION FAILS TO INCLUDE THE NEXT IMPORTANT STEP; THIS MAY INCLUDE AREA AND/OR GEAR CLOSURES TO PROTECT CERTAIN MARINE MAMMALS, SEABIRDS OR EFH FOR SPAWNING POLLOCK OR CORALS.

ALSO, THE CONDITION IMPOSES NO TIMELINES FOR COMPLYING WITH ITS REQUIREMENTS. AS THE ANSWERS TO THESE QUESTIONS ARE VERY IMPORTANT, IT IS CRITICAL THAT THE CONDITION BE UNDERTAKEN IMMEDIATELY AND THE WRITTEN REVIEW HAPPEN WITHIN SIX MONTHS OF CERTIFICATION. THE ASSOCIATED RESEARCH PLAN SHOULD BE IMPLEMENTED WITHIN ON THE YEAR. THE SCS TEAM, STAKEHOLDERS AND THE PUBLIC SHOULD REVIEW THE RESEARCH PLAN THROUGH A WORKSHOP TO ENSURE THAT IT IS ADEQUATE IN SCOPE. APPROPRIATE ACTION BASED ON THE RESEARCH OUTCOMES SHOULD OCCUR WITHIN TWO YEARS.

There is significant information that should be included in the report under this PI regarding the catch in Steller sea lion critical habitat (SSLCH). Also, the report fails to discuss the impacts on harbor seals, the impacts of the different trawl gear used by the GOA pollock fleet – bottom trawl and so-called "pelagic" trawl gear - on benthic habitat, and the fisheries' impacts on EFH and HAPCs. The team should score this PI downward and require precautionary action in addition to the research specified in the condition.

<u>Catch in Steller sea lion Critical Habitat</u>

Approximately seventy percent of GOA pollock is caught inside SSLCH, with the amount varying annually. (p. 81). In 1999, the harvest was 82.8% while the amount in 2002 was 54.9%. (p. 81). Catch in critical habitat dropped because there were no fish to catch, not because the fishing plan protected the habitat.

The analyses of fishery patterns in 2002 presented in the Supplement to the October 2001 BiOp indicated that the current fishery plan allows fishery catches in critical habitat to remain high or to rise to formerly high levels that existed prior to the determinations of jeopardy and adverse modification in the 1998 and 2000 biological opinions. (*See* Supplement to the October 2001 BiOp, pp. 10-22, Table III-4). The report failed to consider adequately the catch in SSLCH. The team should score this PI downward and require that no trawl fishing occur in critical habitat.

<u>Absence of Discussion on Harbor Seals</u>

IN ADDITION, THE REPORT CONTAINS NO DISCUSSION UNDER THIS PI OF THE IMPACTS OF THE FISHERY ON HARBOR SEALS WHICH INHABIT THE GOA AND THAT RELY ON POLLOCK AS A MAJOR FOOD SOURCE.

<u>Absence of Discussion of Impacts on Benthic Habitat, EFH and HAPCs</u>

THERE IS ALSO NO ANALYSIS OF THE IMPACTS OF BOTTOM TRAWL AND SO-CALLED "PELAGIC" TRAWL GEAR ON BENTHIC HABITAT. WHILE THE MID-WATER GEAR TRAWLS IN THE WATER COLUMN, IT IS COMMONLY KNOWN AND ADVERTISED THAT THE GEAR TOUCHES BOTTOM A SIGNIFICANT AMOUNT OF TIME, UP TO 85 PERCENT OF THE TIME. (<u>SEE</u> DISCUSSION UNDER PRINCIPLE 1, PI 1.2.1).

In many heavily trawled areas around Kodiak Island and on the eastern Bering Sea shelf there have been profound changes in benthic megafauna: e.g., large declines in king, Tanner and snow crab stocks throughout the eastern Bering Sea shelf and around Kodiak Island, large increases in predatory flatfishes such as the arrowtooth flounder throughout the Bering Sea and Gulf of Alaska, and apparently large increases in skates in the eastern Bering Sea since 1970. Increases in bycatch of other benthic species such as predatory sea stars (PSEIS, Sec. 4.1, p. 77) have also been observed. What role bottom trawling has played in these changes is not known with certainty, but available evidence from Alaska and elsewhere overwhelming finds that extensive bottom trawling is a major source of disturbance and its cumulative effects alter substrates and have far-reaching effects on benthic communities.

For example, the Alaska Fisheries Science Center *Effects of Fishing Gear on Seafloor Habitat Progress Report for FY 2002* provided information about recent studies on the effects of bottom trawling on soft-bottom sea whip habitat in the central GOA. This study compares trawled areas with the two areas around Kodiak Island that were closed in 1987 to bottom trawling and scallop dredging because of their important rearing habitat and migratory corridors for juvenile and molting Tanner and red king crabs. The closed areas and areas immediately adjacent to them, have rich stocks of groundfish including walleye pollock.

These closures provide a rare opportunity to study the effects of an active bottom trawl fishery on soft-bottom, low-relief marine habitat because bottom trawling occurs immediately adjacent to the closed areas. In 1998 and 1999 the NMFS, Auke Bay Laboratory, initiated studies to determine the effects of bottom trawling on these soft-bottom habitats. Direct comparisons were possible between areas that were consistently trawled each year and areas where bottom trawling had been prohibited for 11 to 12 years. The proximity of the closed and open sites allowed for comparison of fine-scale infauna and epifauna diversity and abundance and microhabitat and community structure. During 2002 focus was on data interpretation and analysis. Three manuscripts are in preparation from this work.

In June 2001 a study was initiated to investigate the immediate effects of intensive bottom trawling on soft-bottom habitat and in particular an area colonized by sea whips. Sea whip biological characteristics and their resistance to two levels of trawling were studied. Sea whips are highly visible and changes in their abundance can be readily quantified. Within the study site, at least two species of sea whips (*Halipterus* sp., and *Protoptilum* sp.) are present with densities up to 10 individuals per m2. Sea whip beds provide vertical relief to this otherwise homogeneous, low relief habitat. *Sea whip habitat may be particularly vulnerable since sea whips can be removed, dislodged, or broken by bottom fishing gear. Furthermore, since sea whips are believed to be long-lived, recolonization rates may be very slow.*[563]

A draft version of Robert Stone's study results provides that inside the dense groves of sea whips in the no-trawl areas, there was 33% more juvenile tanner crab and an increased abundance of cod, flatfish and prey fish compared to the less dense sea whip beds in the trawled areas.

In addition to the chronic, cumulative effects of trawling on seabed habitats and species, "selective harvesting" of commercially valuable species and large differences in catch rates for managed stocks can be a mechanism for initiating ecosystem-altering effects on the structure of groundfish assemblages and food webs over time. For instance, selective harvesting of high value species such as pollock, Pacific cod, Atka mackerel and rockfish may provide a competitive opportunity for "under-utilized" species such as the arrowtooth flounder, which has increased dramatically since the 1970s in the Bering Sea and Gulf of Alaska. This concern has been expressed repeatedly in the Ecosystem Considerations chapters of the annual SAFE documents since 1994. Management failure to address differences in catch rates between heavily exploited species and lightly exploited species, as well the removal of large quantities of non-target species, can ultimately destabilize the entire system and cause radical shifts in the abundance and composition of species (NRC, 1996; Fogarty and Murawski 1998).
At PSEIS Section 3.2.1.2, NMFS cites research of McConnaughey et al. (2000) indicating that there are significant differences in benthic epifauna and overall diversity of sedentary organisms between heavily trawled and relatively untrawled areas of the eastern Bering Sea shelf. The results indicate "that long-term exposure to bottom trawling, at least in the experimental area, reduces diversity and increases patchiness of this epibenthic community." (PSEIS, Sec. 3.2, p. 5). The disturbances and changes in structure of the benthic habitat caused by chronic trawling may enhance the abundance of scavenging species as well. McConnaughey et al. (2000) found sea stars (Asterias amurensis) more abundant in heavily trawled areas. There was a strong negative correlation between sea star abundance and overall benthic megafauna diversity. (PSEIS, Sec. 3.2, p. 10). Intensive fishing may promote populations of opportunistic fish species that migrate into fished areas to feed on animals disturbed in the wake of a trawl tow. (PSEIS, Section 3.2, p. 13).

A review of research on the effects of fishing gear on habitat by Auster and Langton (1999) indicated that mobile fishing gear reduced complexity in three ways: (1) epifauna are removed or damaged; (2) sedimentary bedforms are smoothed and roughness reduced; (3) species which produce structure are removed. (PSEIS, Sec. 3.2, p. 11). Trawling also stirs up sediments and the suspended particles can reduce light levels, create anaerobic conditions

[563] J. Heifetz, ed., R. Stone, *Effects of bottom trawling on soft-bottom sea whip habitat in the central Gulf of Alaska,* Effects of Fishing Gear on Seafloor Habitat Progress Report for FY 2002 (Alaska Fisheries Science Center, Auke Bay Lab) October 2002, p. 8 (emphasis added).

near the sea floor, and smother benthic organisms when sediment resettles. (PSEIS, Sec. 3.2, p. 12). Significantly, NMFS concluded in the PSEIS that *findings from studies of trawling effects on seabed habitats can be applied to Alaska*. (PSEIS, Sec. 3.2, p. 11). All indications are that chronic trawling may play a major role in restructuring the benthic ecosystem in the Gulf of Alaska, Bering Sea and Aleutian Islands:

Although short-term changes in individual species distribution are not likely to substantially affect the ecosystem, the more important question is whether bottom trawl fishing causes long-term changes in the benthic community structure. Persistent changes in species dominance and depressed diversity in response to chronic trawling may profoundly affect the structure and function of the benthos (McConnaughey et al. 2000). Intensive fishing in an area can possibly result in such changes by promoting populations of opportunistic fish species that migrate into fished areas in order to feed on animals that have been disturbed in the wake of a trawl tow (Caddy 1973, Kaiser and Spencer 1994, 1996a). (PSEIS, Section 3.2, p. 13).

ALSO, THERE IS NO DISCUSSION OF THE IMPACTS ON EFH OR HABITAT AREAS OF PARTICULAR CONCERN (HAPCS) SUCH AS CORALS, INCLUDING GORGONIAN CORALS THAT ARE FOUND IN DISCRETE PATCHES IN THE GOA, CUP CORALS, HYDROCORAL CORALS, SOFT CORALS, SEA WHIPS AND SEA PENS, ALL OF WHICH ARE FOUND IN THE GOA. THE HABITAT IMPACT MODEL INDICATES AN 85% REDUCTION IN EQUILIBRIUM LEVEL OF RED TREE CORAL WHEN AN AREA IS SWEPT BY FISHING GEAR AS LITTLE AS ONCE EVERY TEN YEARS. (PSEIS II, 4.5-168.). THE ABUNDANCE OF THESE STRUCTURING-FORMING SPECIES NEEDED TO PERFORM THEIR ROLE AS HABITAT AND SHELTER FOR FISH AND INVERTEBRATES IS NOT KNOWN. (PSEIS II, 4.5-279.) THE TEAM SHOULD SCORE THIS PI DOWNWARD AND REQUIRE THAT THE CONDITION COVER EFH AND HAPC IMPACTS SPECIFICALLY.

<u>PI 1.2.2</u>: **Assessments are conducted to identify and estimate impacts on invertebrate or vertebrate biodiversity and community structure.**
The report finds on p.88 that assessments have been made of most of these topics – impacts on in vertebrate and vertebrate biodiversity and community structure.

However, this is not supported by the recent draft PSEIS which contains numerous statements where NMFS states that there is unknown information regarding species diversity, functional diversity and genetic diversity.

The agency states that the impacts of the $F_{40\%}$ harvest policy on other components of the ecosystem are largely unknown. (PSEIS VIII, F-1-19). NMFS says research is needed to assess ecosystem-level effects of single-species management for many of the target groundfish species. (PSEIS IV, 5-16). The mechanisms and causal pathways for many potential food web effects are poorly documented because they are very difficult to study scientifically at sea. (PSEIS I, 3.8-5). Presently, NMFS states it is not possible to fully and quantitatively account for all factors involved in determining how an ecosystem will respond to fishing activities. (PSEIS VIII, F-3-33). Genetic diversity remains unknown for most species, and the potential direct/indirect effects of fishing on genetic diversity are also largely unknown. (PSEIS II, 4.5-278). The current FMPs have unknown effects on species diversity. (PSEIS II, 4.5-277). NMFS's own admissions of scientific ignorance about the historical or contemporary baseline abundance trends of many of the indicator species in the ecosystem indicate that the range of natural variability in an unfished environment is unknown. For instance, the actual condition of the eastern Bering Sea in the 1950s was uncertain because of the relative paucity of data from that time. (PSEIS I, 3.10-6). Overall, the agency acknowledges that the full effects of these massive fisheries on the ecosystem and its processes are considered largely unknown. (PSEIS, ES-67).

The team should score this PI downward to recognize the significant areas where assessments are not occurring.

<u>PI 1.2.3</u>: **Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.**

The report notes that there has been a large amount of research effort into many aspects of GOA ecology, but recognizes the troubling shortfalls:

Budgeting for research into key questions concerning the effects of the pollock fishery on the ecosystem seems weaker than might be expected knowing that a large fishery is occurring in and around the critical habitats occupied by an endangered species. While there is a research strategy, topics of highest importance in fishery-ecosystem impacts do not appear to receive adequate attention. Testing of key hypotheses have not been aggressively pursued in detail. For example there are many leading questions that continue to be unanswered such as, functional relationship between Steller sea lion foraging and pollock prey densities; the hypothesis that removal of pollock from SSLCH has no effect on food availability to SSL. The enormous increase in spending on SSL research for the past 2 years have occurred as a result of political negotiations rather than a sensible long-term research strategy, and is likely to waste money rather than answer key questions. The fact that the set of RPA regulations have been altered on an almost annual basis means that it is very difficult to look at data sets for potentially impacted wildlife in relation to the management of the fishery, since impacts on population trajectories will likely be occurring over decadal scales. (p. 90-91).

To address the problems with this PI, the team requires research be conducted on the:

- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the regional scale related to stock size and stock geographical distribution;
- Relationships between Steller sea lion foraging behavior (especially as this relates to foraging economics or sea lion foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling;

While the answers to these questions are critical, this condition should provide specific parameters for the research to ensure that it is effectively undertaken. Also, this condition fails to require any timelines for the research. As these issues are critical and have proven elusive for years, this research must be done as soon as possible. As such, the team should require the research plan be designed immediately and the research begun within six months. Furthermore, there is no requirement that the research results be used for any change in the management strategy. This should be expressly included in the condition. Also this condition fails to require research regarding the decline of harbor seal populations and pollock prey abundance at the local and regional scale.

Until information is known from the research, the team should require conditions that demonstrate more precautionary action such as reducing ABC levels to account for predator needs and reducing TAC levels to account for uncertainty, and establishing area and/or gear closures for different purposes such as to protect spawning pollock.

<u>PI 1.2.4</u>: There are monitoring programs to quantify fishery impacts on the biodiversity of invertebrate and vertebrate communities in relevant habitats.

The report states that there are many monitoring programs that provide long-term data relevant to investigating effects of the fishery on the wider ecosystem and that details of these programs are given in the APA submission. (p. 92). However, the APA submission is not available to the public so information on these programs is not known. At a minimum, these programs should be summarized in the discussion of this PI to support the assertion that there are numerous relevant monitoring programs. In addition, each of the 5 bulleted requirements under the 80 SG level must be addressed to demonstrate how the fishery scores above this level. Because of the lack of supporting information, the team should score this PI downward.

PI 1.3.1: Abundance and/or productivity of animals have been monitored over time such that the fishery can be managed taking into account both natural and fishery impacts on animal abundance.
The report notes that there are many research programs that provide relevant data to investigating effects of the fishery on the wider ecosystem, and population abundances of many species are well known. The team specifically relies on "data on productivity, including spatial and temporal patterns, and trophic relationships, for several of the key wildlife such as marine mammals and seabirds." (p. 94). While the report finds that information on fish and invertebrate populations is less readily found, the team is satisfied that the information in the Ecosystem Considerations chapter provides a detailed interpretation regarding fisheries interactions and potential management implications.

The report fails to demonstrate how the abundance and productivity data is used to manage the fishery taking into account both natural and fishery impacts on abundance as stated in the PI. Previously the report notes that the information in the Ecosystem Considerations chapter is not used in management decisions and setting harvest levels. Thus, it is inconsistent to rely on the Ecosystem Considerations chapter for this PI to give it a score above the 80 SG level. In addition, the report does not list the research programs and species that are their subject to support the statement that there are many research programs that provide relevant data. In the absence of supporting information, this PI should be scored downward.

PI 1.3.2: Communities of animals in the habitats likely to be affected by the fishery are known.
The report states that there is broad knowledge of the distributions of habitats and communities, and about major trends over time, including habitat maps and the composition of invertebrate and vertebrate communities measured at a large number of sites over a significant period of years. (p. 95). The team finds that corals and the communities of zooplankton are two aspects of community distribution and composition that have been examined in relatively little detail and suggests that data on these subjects would be valuable.

The report fails to address the bulleted requirements of the 80 SG level. The analysis for the PI does not reflect that studies of invertebrate and vertebrate population densities across the geographical range of the fishery are being carried out on species identified as being affected by fishing. There is no discussion of the specific populations being studied, where in the geographical range of the fishery they occur, and whether these species are identified as being affected by fishing. In addition, other than the example provided of seabird research, there is no discussion of the specific studies of trophic relationships, production and spatial variations in animal abundance and productivity. Without specifically addressing the PI's requirements, coupled with the finding that there are little studies on coral and zooplankton communities, the score must be lowered to the SG 60 level.

PI 1.3.3: Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.
The report correctly states "Research on the functional relationships between predators and pollock abundance and/or distribution has largely failed to determine whether or not predator populations are being affected by the pollock fishery." (p. 96). The report discusses specifically concerns about the pollock fisheries' effect on jellyfish booms, the increase of Arrowtooth flounder populations and the decline of Steller sea lions. The report notes that

the GOA TAC has tended to be set at the highest level permitted by the ABC in recent years when the stock has been decreasing to all time low levels, despite the fact that the impact of a stock so greatly reduced in abundance on the wider ecosystem (and especially on SSL) is largely a matter of speculation. In the latter context we recognize that several risk-aversion measures have been put in place for the 2002 and 2003 ABC setting process that have reduced the ABC for pollock and thus the GOA TACs. According to the 2003 SAFE document for GOA pollock, "The elements of risk-aversion in this recommendation relative to using the point estimate of the model and the maximum permissible F-ABC are the following: 1) fixing trawl catch-ability at 1.0, 2) assuming an average 1999 year class instead of the model estimate, 3) not adjusting the 2002 Shelikof Strait survey biomass estimate despite evidence that the fraction of the stock spawning in Shelikof Strait was lower in 2002, 4) applying a more conservative harvest rate than the maximum permissible F-ABC. Collectively these risk-averse elements reduce the recommended ABC to less than 40% of the model point estimate." Therefore it is clear that the ABCs have been set conservatively in response to uncertainties in the GOA stock assessment data (which seem to have increased in recent years with the decline in stock biomass). However, it may be useful to note that where studies have investigated responses of top predators to reductions in their food fish abundance, decreases of 70-80% in food fish stocks (i.e. approximately the situation currently existing with Pollock in the GOA), have led to some dramatic reductions in predator densities or breeding performance. However, responses may vary considerably among species as a function of their vulnerability resulting from aspects of the individual species' ecology. (p. 96-97).

The report recognizes that "a 70-80% decline in pollock abundance in the GOA may be expected to affect foraging top predators that are sensitive to food availability." (p. 97). The report states that "the fact that SSL has an energetically expensive mode of foraging, and carries little fat reserves, would tend to suggest that sea lions will be more sensitive to reduced prey availability than some other species." (p. 97).

The team imposes the following condition on the fishery to address the deficiencies in this PI:
The fishery must establish a research panel and write reports examining if there are significant issues of concern related to:

- The influence of the pollock fisheries on jellyfish blooms;
- Increases of Arrowtooth flounder and other predators that may be infilling the 'large pollock' niche;
- (Concerns regarding the relationship between the pollock fisheries and SSL are dealt with under Indicator 2.3.1)

While these are valid issues to address, the bulleted areas for research are too vague to meaningfully direct research. The team should require that there be a public workshop where the scope of the research is discussed. In addition, there are no timelines attached to this condition. The condition should require that the research begin immediately and the reports be finished within a year. Moreover, the condition fails to include any required action or management response if the research demonstrates that that the pollock fisheries are adversely impacting the specified species of concern.

Further, as discussed extensively under Principle 1 and identified in the CIE report, there are numerous areas of uncertainty in the GOA stock assessments that are not considered adequately or at all in the ABC levels. Contrary to the quoted section from the report above, it is clear that the ABCs have NOT been set conservatively in response to uncertainties in the GOA stock assessment data.

<u>PI 2.1</u>: The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.
The team scored this PI below the 80 SG because of "the fact that the impact of the fisheries on protected pollock predators is largely unknown." (p. 99). We agree with the assertion that "[i]n the presence of this uncertainty, given

the general lack of knowledge as to whether pollock fishing affects populations of pollock predators (especially Steller sea lions, harbor seals) a precautionary approach to fishery management would be expected." (p. 99). The report finds little evidence of precaution to avoid possible impacts on harbor seals despite some evidence suggesting an impact and suggests that a more precautionary approach to constraining harvest from critical areas for predators would seem warranted. The report states that setting ABCs using an approach that better incorporates ecosystem considerations would be more precautionary. The team requires the following condition:

The fishery must:

3. Adjust management as described in the Conditions under Indicator 1.1.
4. Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.

Please see our comments regarding PI 1.1 to understand our concerns with that condition. Additional requirements for this condition should include the establishment of area and/or gear closures for declining marine mammals such harbor seals and seabird species.

PI 2.2.1: The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act

The team scores the fishery "slightly below 80, primarily because the indirect impacts of the fishery are very little understood, and in the presence of major uncertainty about the effects on these species the management does not fully meet the requirement to be precautionary." (p. 100). The report notes the focus on the endangered Steller sea lion for this PI, which is protected under the federal Endangered Species Act. Significantly, the report states:

In passing we note that in the GOA, the TAC has usually not been reduced below the ABC when stock has fallen (so potentially reduces food for Pollock predators), and indeed the % exploitation rate has increased in many recent years when stock has been smallest (though it was reduced in 2002 and 2003 due to higher uncertainties over stock assessment data and consequent precautionary setting of the ABCs). Therefore when the stock has been smaller, the TAC has been set on a single-species basis as high as the ABC would permit, yet this is the very time when a more precautionary TAC reduced in the light of ecosystem concerns might have been appropriate. (p. 100).

The report notes that the reasonable and prudent alternatives (RPAs) represent the Council's main management tool intended to avoid impacts rather than limitations on ABCs or TACs (unless the stock falls to below 20% of unfished biomass in which case the fishery closes to avoid further depletion). (p. 100-101). The report correctly states that despite the RPAs, the fishery has continued to take a high proportion of pollock from SSLCH. Also, there is little evidence of monitoring programs designed to test the efficacy of any implemented sea lion protective measures. The team concludes that "[g]iven that the impact of pollock fishing on Steller sea lions is still not well understood, and the absence of any clear scientific understanding of the consequences of SPMs, it does not appear that the management is taking a systematic approach to being precautionary." (p. 101).

To address the problems with this PI, the team requires the following condition:

With regard to Steller sea lions (SSLs), current management measures regulating fishing in SSL critical habitat were developed, in large part, based on satellite telemetry data collected to define important SSL foraging areas. To improve the deficiencies in performance for this indicator, the team calls for rigorous peer review of the telemetry data analysis given the significant role of the telemetry data in setting the regulatory regime. Given these considerations, the evaluation team sets for the following conditions:

4. The analysis of the satellite telemetry data used to justify the 2001 BiOp should be subject to external peer review and the results of such review shall be available to the certifier within 6 months of a final determination for the BS/AI fishery. NMFS should submit the telemetry data analysis to the Center of Independent Experts (CIE). The University of Miami's CIE administers a review process, drawing from a formal pool of qualified scientific experts, ensuring the selection of a panel free from the influence of either NMFS or other groups with a vested interest in the review's findings. It is very important that the panel should contain 2 or members with expertise in the analysis of PTT data from marine vertebrates.
5. The management system should consider the input received from the CIE review and act appropriately.

We find the scoring of this PI too generous as the report states it is just under the 80 SG level. The analysis above identifies significant problems with the fishery regarding Steller sea lions. About seventy percent of pollock harvest occurs inside SSLCH, although the value varies annually. (p. 81). For example, in 1999, harvest in CH was 82.8% while in 2002 harvest in CH was 54.9%.[564] (p. 81). The trend from 1991 to 2003 shows no consistent direction of change over the period. (p. 81).

In addition the 60 SG level provides, "Ecosystem aspects of management are treated as minor, 'bolt-on' aspects of the management system of the fishery, which is essentially single-species target stock management, adapted where necessary to comply with other legislation." This is precisely how the North Pacific groundfish fisheries are managed. As such, the score should be downward to reflect the problems identified. The analysis should demonstrate the increased catch in SSLCH and require a condition to allow no trawl fishing in critical habitat.

We agree that the telemetry data should not be the basis for management decisions as it is premature and there was no rational connection between NMFS' reliance on the data and its determination that the fisheries were not jeopardizing Steller sea lions as found by the federal court Judge Zilly in the litigation to protect Steller sea lions. Please see the attached comments from June 10, 2003 on the Draft Addendum to the October 2001 BiOp to understand concerns with the agency's reliance on the telemetry data and regarding the draft Addendum to the BiOp. We support the six-month timeline for the external peer review of this data. However, there are no timelines for the other requirements of this condition. No. 2 should be done within six months of receiving the CIE review and the specific management actions should be reported to the evaluation team.

The team recognizes the need for precautionary management where impacts on Steller sea lions cannot be ruled out. In accordance, the team should require additional precautionary measures to address the deficiencies with this PI. This should include for stocks managed in Tiers 1-3, setting the target fishing rate at $F_{75\%}$ as an ecosystem proxy and set MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics) for important target prey species such as pollock. In addition, there must be explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species and habitats. For stocks managed in Tiers 4-6 for which there is not adequate information to estimate biological reference points

[564] Catch in critical habitat dropped because there were less fish to catch, not because the fishing plan protected the habitat.

(BRPs) and minimum stock size threshold (MSST), there should be no directed fishery TAC specified until data is available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Stocks managed Tiers 4-6 should be designated as bycatch-only status and require full retention and utilization of bycatch species in Tiers 4-6. In addition, uncertainty factors must be incorporated systematically into ABC/TAC levels to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways.

In addition, the report should address harbor seals under this PI.

PI 2.2.2: Management of the fishery includes provisions for acquiring, integrating and synthesizing new scientific information from protected species research, management and recovery programs outside fishery management.

The report notes the high quality scientific review of available data by NMFS, but notes that the "link between scientific review of issues and integration of this information into the management process has not yet been developed in a way that permits these wider ecosystem issues to be fully incorporated into the management process." (p. 102). The team scores this PI above the 80 SG because it concludes that "the management system fully recognizes institutional responsibilities regarding protected species, and has established mechanisms to conduct integrated and synthetic environmental assessment." (p. 102).

However, the team should have scored this PI below 60 because the "management system is reactive rather than proactive" regarding its treatment of protected species as well as target stocks, as pursuant to the SG 60 level. In general, only after being required by court order has the management attempted to make changes regarding Steller sea lion protection.

PI 2.3.1: Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.

Regarding PI 2.3.1, the evaluation team found that the fishery's indirect impacts are difficult to assess and an experimental approach is required to test the key hypothesis that Steller sea lion foraging is affected by pollock harvested from SSL critical habitat. (p. 104). Consequently, the team imposed the following condition:

[T]he fishery must design and carry out experiment(s) to test the suggested impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in 'experimental' and 'control' areas on SSL behavior, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller Sea Lions, 2002) also recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. Therefore we set this condition requiring the fishery to carry out the experimental study recommended by the NRC report or an improved version as recommended by the National Marine Mammal Lab (2003).[565] (p. 104).

This last sentence in this condition should be changed. The use of the word "or" between the NRC report and "an improved version as recommended by the National Marine Mammal Lab" (NMML) is misplaced as it gives the fishery the ability to choose between very different versions to design an experimental study. The experiment proposed by the National Research Council (NRC) needs significant elaboration in what constitutes a meaningful design. The NMML evaluation notes specifically the areas where increased detail and additional requirements are necessary to conduct an effective and meaningful experimental study.

[565] Note that Principle 2 PI 2.3.3, PI 3.2 and Principle 3 PI 1.2 state that to meet the requirements for these PIs, the fishery must meet the requirements for the condition under Principle 2 PI 2.3.1.

Bowen et al. (2001) listed a series of issues that must be resolved in designing a Steller sea lion fishery effects experiment:

1. what is an experimental unit (rookery, cluster of rookeries and haulouts)?
2. how many replicates of the treatment (no fishing as defined by NRC) and control (fishing) experimental units should there be?
3. what is the size of the experimental units?
4. how long should the experiment last?
5. what response variables will be measured (e.g., morphometric, energetic, demographic, behavioral, ecological) and how are they expected to change in the treatment and control populations?
6. what level of change in the response variables will be detectable between treatment and control populations given various designs and sample sizes?
7. how will the treatment be measured (fishing days, biomass removed, number of tows)?
8. how will differences in the impacts of other factors (e.g., subsistence hunting, predation) be accounted for in the treatment and control experimental units?
9. will replication of treatment and control units within ecosystems be sufficient to untangle climate and fishing effects which will likely affect response variables in similar ways?

The experiment is only meaningful if the design incorporates all the critical parameters, the areas are truly representative of spatial needs of Steller sea lions and the duration of the experiment is long enough to evaluate the effects of fishing on Steller sea lions. Most significantly, the experiment must include closed areas that replicate the habitat and foraging needs of Steller sea lions. The team should identify the areas in the NRC report that require further specificity and definition and note it under this PI. (<u>See e.g.,</u> NMML, *The Evaluation of the Experiment Proposed by the National Research Council to Determine the Effects of Fisheries on Steller Sea Lions*, June 2003). In addition, the team should identify all the critical parameters that the experiment must incorporate.

Also, the condition fails to include any timeline for the experiment to be conducted. Given the importance of the hypothesis to be tested by the experiment and the fact that the RPA in the FMP BiOp included contemplated a similar experiment in November of 2000 that has not occurred, time is of the essence. The team should require a substantial public process that begins immediately to refine the experimental design, including outreach to the public, independent experts, the conservation community, and relevant government agencies. Next, the condition should require the experimental design be submitted to your team within six months of certification and the experiment begun within three months after the design is approved and the experiment should continue for at least five to ten years as recommended by the NRC report.

Further, the condition fails to require that the results of the experiment will be used for any specific purpose by the management. Ongoing results should be reported to the team every six months during the five years of certification. If at any time, the results indicate fishing is causing adverse impacts on Steller sea lions, the team should revoke the certification.

<u>PI 2.3.2</u>: **Permitted take levels for endangered and threatened species, and threshold levels of unacceptable impact have been identified for protected or icon species in fished areas and the fishery is managed in accordance with national and/or international laws on endangered and threatened species. Threshold levels of unacceptable impact have been identified for habitats in fished areas.**

The report finds that take levels are low and do not harm population size at p. 105. While it is true that the fishery has a low level of direct take of Steller sea lions and other marine mammals, this has no always been the case. Historically, when Steller sea lions were much more abundant, they more frequently were caught and killed in the trawl nets. In addition, fishermen used to regularly shoot sea lions and this practice continues today although at lower levels. The discussion under this PI should address these issues.

The report notes that there is some uncertainty as to whether the fishery may impact EFH in terms of pollock spawning aggregations. (p. 105). Other than this statement, the report fails to elaborate on the possible impact to pollock spawning aggregations. The fishery is concentrated primarily during the winter on pre-spawning aggregations in Shelikof Strait and near the Shumagin Islands and there is significant uncertainties regarding stock structure and their relationship as described above. As such, the fisheries' impacts on spawning aggregations are of serious concern.

The report also states that impacts to benthic habitat are very slight because of the mid-water trawling. (p. 105). There is no discussion at all about the bottom trawling that occurs in the GOA pollock fishery. Impacts from bottom trawling are significant; please see our comments under PI 1.2.1. As stated previously, it is incorrect to assume that because the fishery uses so-called "pelagic" trawl gear, there are no impacts to benthic habitat. Discussion should include the amount of time the gear touches bottom and analyze the impacts from such contact on the seafloor as well as invertebrate species.

The SGs for this PI only address the take issue and fails to discuss whether the threshold levels of unacceptable impact have been identified for the species and the habitat as stated in the PI. The analysis under this PI fails to note that there are likely unacceptable impacts on Steller sea lions and harbor seals by the fisheries through food competition as noted elsewhere in the report. Further, the analysis fails to highlight in this PI that the agency has not determined what are the threshold impact levels by the fisheries on Steller sea lions and harbor seals, although the discussion under other PIs notes this. Taking these important points into consideration should result in a score below 60 for this PI.

<u>PI 2.3.3</u>: Research is carried out to allow impacts of the fishery on endangered, threatened, protected and icon species to be identified and measured.

The report states that there has been a failure to collect the necessary data to test the hypotheses that the fisheries are competing with Steller sea lions for food and adversely impacting their habitat. (p. 106). Also, the team finds that functional relationships between other marine mammals and seabirds and the pollock fishery have received even less attention than for Steller sea lion. The team concludes that "Given the present lack of information on the effect of the fishery on prey fields, and lack of information on the prey field required by predators for economic foraging, management of catches in 'critical habitat' cannot take a scientific approach to setting acceptable levels of harvest from critical habitat." (p. 106). To address this problem, the team requires that the condition for PI 2.3.1 be met for this PI. Please refer to our comments on PI 2.3.1 where we discuss the importance of correctly designing experimental open and closed areas.

<u>PI 2.3.4:</u> There are monitoring programs to assess fishery impacts on endangered, threatened, protected or icon species that have been identified as vulnerable to fishing impacts.

The report relies on the existence of programs that monitor the population sizes and demography of Steller sea lions, harbor seals, Pacific sleeper and salmon sharks to score the fishery close to the 100 SG level. (p. 107). Nowhere in the analysis, however, does the team address how the monitoring measures fishery impacts on the identified populations or whether the information collected is used to properly manage the fishery to comply with the law as required by the 100 and 80 SG levels. The mere fact that different agencies monitor population sizes and trends does not mean that they are assessing fishery impacts as required by this PI. In fact, the monitoring has been unable to assess fishery impacts on vulnerable and listed species to date. Without demonstrating that the monitoring programs are assessing fishery impacts on endangered, threatened, protected or icon species, the fishery has not complied with the requirements of this PI. As such, the team should have scored the fishery at the 60 SG level.

PI 2.4.1: **Functional relationships involving endangered, threatened, protected or icon species are adequately understood for the purposes of minimizing the fishery's impacts on such species.**
The report states that there is basic knowledge of the ecology of endangered, threatened, protected and icon species in the fishery area. (p. 109). The report notes that functional relationships remain largely a matter of speculation due to the lack of research directed specifically to answer this key question. The team asserts that current research may shed light on these questions following a research strategy coordinated by NMFS. The team should have scored the fishery below 80 because the analysis fails to address each bulleted requirement for that SG level. In fact, the discussion notes that the functional relationships are speculative. While the team is hopeful that NMFS' current research will be illuminating on the open questions, there is no demonstration that a research strategy is in place to ensure that current research continues until there is a concrete understanding about the functional relationships of the species. The report should discuss the specific research projects designed to answer questions about understanding functional relationships. In addition, it should discuss the waning funding for research. In sum, the fishery should be scored downward to the 60 SG level.

PI 2.4.2: **Trophic (predator-prey) relationships, especially those involving endangered, threatened, protected or icon species, are adequately understood for the purposes of minimizing the fishery's impacts on such trophic relationships.**
The report states that diets of important animals are generally well known within the constraints usually arising in such studies and that there is a basic understanding of the foraging behavior of important animals in the food web, especially endangered, threatened, protected and icon species. (p. 110). The report cites specific studies that quantify the diets of particular top predators, develop diet study methodology for particular predators, and use indirect measures of diet such as fatty acid signatures and stable isotope ratios. (p. 110).

The team scores this PI above the 80 SG level because the requirements are quite lenient. However, the report is rife with notations that there is not adequate information about the fisheries impacts on marine mammals and seabirds, i.e., trophic relationships because there has not been research focused directly on this issue. Thus, the score awarded here seems inconsistent with the analysis in previous sections of the report.

PI 2.4.3: **Population sizes and population trends of endangered, threatened, protected or icon species are adequately known, together with the nature and distributions of their essential habitats.**
The report notes that the presence and distributions of endangered, threatened, protected and icon species and their habitats in the area of the fishery are known. (p. 111). The report finds that research is being undertaken to add to the existing basic knowledge of numbers, distribution, demography and population trends. The team scores this PI under 100 because of the following reasons:

- data on the absolute abundance of sharks are not available;
- there are some difficulties in interpreting population trends in harbor seals as a result of limitations in the survey effort and hence in the confidence intervals on specific population estimates;
- the nature and distribution of essential habitat is not well known for most species;
- Steller sea lion foraging distributions are poorly known and somewhat confounded by the recent premature attempts to use satellite tracking data of sea lion distributions to infer where the animals forage on the (unlikely) assumption that where animals rest maps closely onto where they feed.

The deficiencies identified by the team are significant and warrant the requiring of conditions to address this important data gaps.

PI 3.1: **Management strategies include provision for restrictions to the fishery to enable recovery of populations of impacted species that have been depleted by previous actions of this fishery.**
The report notes that depleted species include some stocks of herring, salmon and crabs, Steller sea lions and possibly harbor seals. (p. 113). The report states that management has been responsive to the need to minimize marine mammal bycatch, and the pollock fishery meets standards set for this. (p. 113). The report then states:

However, the various RPA actions to reduce impact of the Pollock fishery on Steller sea lion prey fields have been based on little scientific knowledge of either the critical habitat for foraging Steller sea lions or on the impact of fishing on Pollock prey fields within SSLCH. Therefore the RPAs have been somewhat arbitrary. These have also not been evaluated, and so it is impossible to say with any confidence that the RPAs have been beneficial to Steller sea lion recovery. Therefore, on balance, the 80 scoring guidepost seems to describe the situation well for the Gulf of Alaska. (p. 113).

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The high score awarded by the team for this PI does not follow logically from the analysis. The report correctly notes that the RPAs have been arbitrary and not demonstrated to be beneficial to Steller sea lion recovery. Surprisingly though the team scores this PI at the 80 SG level. There is no analysis of how the management in the GOA modifies fishing to reduce impacts on depleted species such as herring, salmon, crabs and harbor seals as required by the SG 80 level. Other than stating that the pollock fishery meets the standard for minimizing marine mammal bycatch, there is no discussion of any specific management measure that the agency is employing to restrict the fishery to allow populations to recover. For example, there is no discussion of the fishery's impacts on harbor seal prey fields or that the management does not employ reduced TAC levels to address food competition issues. In addition, there is no discussion about the lack of habitat and prey field protection for harbor seals or any depleted species.

The team should have scored this PI below the 60 SG level which requires "Management takes account of statutory requirements to protect endangered and threatened species but contains little or no provision for recovery of populations of other impacted species that do not enjoy ESA protection." As discussed primarily under Principle 3, the agency fails to take proactive measures to protect endangered species as evident by the history of management actions regarding Steller sea lions.

PI 3.2: **Changes in management have been implemented in order to recover affected communities of animals, habitats, or populations of impacted species that are believed to have been depleted by previous actions of this fishery.**
The report notes that management responses to declines of Steller sea lions have not been timely and have been made in a "somewhat erratic and inconsistent way, with little assessment of the outcome and efficacy of the changes introduced." (p. 114). The report states "The balance of the evidence tends to suggest that Pollock stock biomass is predominantly determined by environmental variation rather than by fishing mortality (see Principle 1 text), while the balance of the evidence on the causes of Steller sea lion decline seems to point towards top-down rather than bottom-up (i.e. food) limitation (Committee on the Alaska Groundfish Fishery and Steller Sea Lions, 2002)." (p. 114).

To deal with the problems in this PI, the team requires the following condition: the fishery must modify management of the fishery to address concerns identified from research required under conditions attached to Indicators 1.2.3, 2.3.1, and 2.3.3.

Please see our comments regarding PIs 1.2.3, 2.3.1, and 2.3.3. In addition, as discussed under Principle 1, we disagree with the conclusion that the low pollock abundance in the GOA is caused by environmental variation. Regardless of the cause of low pollock biomass levels, the management response has not precautionary as demonstrated by the recent increase in catch levels by 31 percent. In addition, there is no discussion about harbor seals, salmon, crab and herring stocks and management actions that have been made to recover these populations.

PI 3.3: There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.
The report recognizes that alterations to fishing to recover and rebuild depleted species are based on very incomplete data and understanding. (p. 115). The report correctly states that "in the GOA it is difficult to make a strong case that management to recover populations of depleted marine mammals has been precautionary, since the quantities of pollock removed from SSLCH have hardly been reduced from their previous high levels despite the series of different restrictions placed on fishing close to SSL rookeries and haul outs in recent years." (p. 115). The team asserts that the "fact that it is unclear whether the fishery is the cause of declines in SSL populations is not a satisfactory reason for lack of action. The uncertainty over impact should have led to research to identify whether or not the fishery is the cause, and management should have responded in a timely manner and to introduce precautionary management until the cause-effect relationship had been resolved." (p. 115).

The report finds that there is a need for research to determine what pollock biomass or density is required by populations of harbor seals, kittiwakes and murres to permit them to forage at rates that support healthy populations and reproduction. (p. 116).

To address the problems with this PI, the team requires the fishery to meet the same requirement as under PI 2.3.3 for harbor seals, kittiwakes and murres, as well as for SSLs. The condition required under PI 2.3.3 is to meet the condition required for PI 2.3.1 which is to undertake the experimental open and closed areas to see the impacts of the fishery on Steller sea lions. This condition would extend a similar experimental study to fur seals, harbor seals, kittiwakes and murres. This condition would be clearer if it referenced the condition required in PI 2.3.1 as the condition in PI 2.3.3 refers to that condition. Any experimental study should be carefully designed in the way we discussed under PI 2.3.1. Please see our comments under that PI.

C. MSC PRINCIPLE 3

MSC Principle 3 states: "The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable."

The Alaska pollock fisheries fail to meet Principle 3 because the North Council and the agency do not have an operational framework for ensuring that the pollock stock populations are sustainable and that the pollock fisheries do not adversely impact the Bering Sea and Aleutian Islands ecosystems. Both the Council and NMFS have a history of acting to mitigate the effects of the pollock fisheries primarily when forced by the federal district court through litigation. In over a decade, there has been no stable management of these fisheries because successive FMP amendments have failed to address the root problems in the fisheries. In recent years, the fisheries have operated under emergency rules and Congressional riders following industry outcry over recommended management changes spurred by court decisions.

The Council and NMFS have disregarded the advice of NMFS' marine mammal scientists in reversing the decline of endangered Steller sea lions and curbing the impacts of the fisheries on other declining species. NMFS itself has determined that pollock is one of three fisheries jeopardizing the continued existence of Steller sea lions and adversely modifying its critical habitat.

In the course of the ongoing litigation against NMFS to protect Steller sea lions from the adverse impacts of the pollock fisheries, the agency has been found repeatedly to violate the Endangered Species Act and the National Environmental Policy Act (NEPA). Those violations continue as the agency is authorizing the groundfish fisheries in the absence of a legally sufficient programmatic environmental impact statement and the Addendum (also known as the Supplement) to the October 2001 biological opinion on the effects of the fisheries on sea lions has significant legal deficiencies, making it vulnerable to challenge in court. Please see attached comments on the draft PSEIS and the Addendum to the October 2001 BiOp.

1. Problems in the Introductory Narrative to Principle 3

There are a number of issues raised in the introduction to the MSC Principle 3 evaluation that need to be addressed. These regard the scope of what the team considers the "management system," the view of when in time the management system should be evaluated, the importance placed on the draft programmatic Supplemental Environmental Impact Statement (PSEIS) for the groundfish fisheries, and the view toward the extensive litigation that has occurred regarding illegal agency action.

a. The team uses an improper definition of the "management system."

In page 117 in footnote 2, the report states:

As used in this report, the term "management system" is used broadly to include both governmental and private sector components. Governmental components include all applicable governmental systems, not merely the direct regulatory function of a single agency such as the National Marine Fisheries Service, which clearly has the dominant regulatory role, but often is not in full control of institutional forces affecting the fishery. The judicial system is intended to be considered part of the "management system", as is the federal legislative branch. Neither the courts nor Congress regulate the fishery in the traditional sense of the word, but from time-to-time it is undisputable that judges and legislators are deciding major issues for the fishery. Private sector components of the management system include the fishing industry itself and components thereof, such as catcher cooperatives. As both a matter of law and fact, responsibility for management of the pollock fishery lies in many hands throughout government and the private sector. The pollock management system is an intertwining of many subsystems, and it is the evaluation team's view that the system must be assessed as a whole.

We strongly disagree with this broad construction of the term "management system". The management system does not consist of all or even most of the "institutional forces affecting the fishery." Rather, the management system is that system created by federal law to manage the federal fisheries. In the case of a U.S. fishery, the management system under evaluation should be the National Marine Fisheries Service (NMFS) and, and the agency's handling of the advice given to it by the North Pacific Fishery Management Council (the Council). These bodies have direct regulatory control of the pollock fisheries and are the sole entities that manage them. In fact the Magnuson-Stevens Fishery Conservation and

Management Act, as amended by the Sustainable Fisheries Act, is clear that the management is comprised of NMFS and the Council.

The evaluation teams' defining the "management system" as "all applicable governmental systems" including the judicial system, the federal legislative branch, and private sector components such as catcher cooperatives is unacceptable. This is not an inquiry into whether a democratic system of government with three distinct branches works. It is an inquiry into whether the federal fisheries management regime, defined by statute and regulation, works. The courts and Congress get involved with the fisheries management system when it fails in some way. The judicial and legislative branches act as external correctives to the management system, not as an integral component.

The judicial system is not a part of the fishery management system, and its participation in any aspect of fisheries management does not demonstrate that fisheries management works. Rather it demonstrates precisely the opposite. The judicial system has involvement with fisheries only when it has been demonstrated that fisheries management is illegal. That the federal courts can offer some redress for illegal fisheries management actions does not demonstrate that the fisheries management system works. To argue that it does is like arguing that the fact that one can sue a drunk driver for damages demonstrates that the traffic management system works. Courts redress wrongs. Courts correct illegal actions. Defining courts as part of the management system effectively assumes that illegal actions are par for the course. This is unacceptable.

The legislative branch is also not part of the fishery management system, and generally intervenes when some party is unsatisfied with the performance of the fisheries management system. While Congress passes the laws that affect the pollock fisheries, nobody in the Senate or House of Representatives has any formal involvement in the day-to-day management of the fisheries. Although Alaska's Senator Ted Stevens is interested in the groundfish fisheries and has attempted to use his power as Chair of the Appropriations Committee by attaching fisheries related amendments to non-related pieces of appropriations legislation (known as riders), he does not manage the fishery.

Finally, the private sector is clearly not part of the management system. Cooperatives are comprised of corporate and private business entities that are primarily interested in making money. They are motivated by generating maximum profits and see fish as a market commodity. This is in marked contrast to government agencies that are charged with being stewards of public federal resources for the benefit of all citizens.

The broad interpretation of "management system" to include all branches of government and voluntary industry bodies has very significant consequences for this certification evaluation. It results in many of the PIs receiving higher scores than if the consideration of the management system was properly restricted to those legal entities charged with fisheries management – NMFS and the Council. If the scope of the management system was limited to the actual bodies that are involved in the daily management of the fisheries, the pollock fisheries would clearly fail under Principle 3 to meet the minimum score required for certification.

We urge the evaluation team to revise the definition of the "management system" to include only NMFS and the Council. This change would require the team to re-evaluate all PIs under Principle 3 and revise its analysis and scoring. The outcome would certainly change and result in significant downward scoring.

b. The team has an improper view of sustainability.

After summarizing some general pros and cons about the management system, the report defines how it views sustainability and the management system. It states:

Does this mean that the management system for the pollock fishery is per se sustainable? If there were a single, inarguable, fixed definition of sustainability; if all scientists, managers, fishers, conservationists could agree on what makes a fishery "sustainable", it might be appropriate to fix only on the way the fishery management process works today to draw a comparison between the object and its measure. But we do not have that. We have a growing and improving understanding of the earth's ecological processes and the parts that make it up. And, not coincidentally, we have a growing and improving understanding of what we are capable of managing in and through the ecosystem. Here, where the definitional goal itself is in movement, the most revealing quality of the system by which we manage a fishery to be "sustainable" is that system's ability to deliver ever-improving results. The system cannot lock onto a fixed target; it must move forward in response to evolving understanding of what it should and can do. (p. 119).

The team views the definitional goal of sustainability as evolving and consequently looks to whether the management changes with the definition. The team's view of sustainability supports that the MSC certification is in fact a process certification rather than a product certification. However, the MSC appears to consider the certification as a product certification. If MSC certification is a product certification, then the definition should be fixed so that there is no ambiguity regarding the standard applied to determine if the fish product meets the principles and criteria at the time of certification. Also, as a product certification, the fisheries should be required to achieve the conditions prior to being certified and obtaining the benefit of certification, especially the use of the MSC label on consumer products.

Unless and until the MSC makes clear that its certifications are process certifications within the meaning of standard international trade terminology, and that no fishery that has been certified so far is either sustainable or well-managed, we cannot accept the moving definition of sustainability or "conditions for continuing certification." Certification with such conditions misrepresents the current state of the fisheries which have not demonstrated they have complied with the MSC Principles and Criteria, and there is no guarantee the fisheries will comply with the conditions and their noncompliance be held accountable in a timely manner.

While we agree that it is important for the management to adapt to change and to meet improved standards for what is deemed sustainable, we disagree in the way the team is looking at the fishery management system to evaluate it. The team's view results in not accurately evaluating the management because it can always get the benefit of the doubt as long as it changes. It is not enough to say that past significant mistakes are of no consequence as long as the management system stops using the approach that led to the problem or starts to address a problem after inaction. The team should look at the management as it exists today and in the recent past. This informs how the system works in the present because the repercussions of past actions haunt the management and ecosystem today and predicts how the managers will respond to the evolving definition of sustainability.

c. The team's reliance on the PSEIS is problematic.

Numerous times under Principle 3, the report states optimistically that the PSEIS is a positive sign that management system is looking at the whole ecosystem which will be essential to inform its management decisions. The report states,

In the view of the evaluation team, the pollock fishery management system has shown in the past several years the most revealing positive sign conceivable: It has begun to ask the right questions.

NMFS and the North Pacific Fishery Management Council ("North Pacific Council" or "NPFMC") have launched a comprehensive analysis of North Pacific groundfish management through preparation of the so-called "Programmatic Supplemental Environmental Impact Statement" ("PSEIS"). In the course of developing the analytical framework for the PSEIS, the management system has begun to organize itself to make informed choices about how to manage fishing activities fully within the context of the human and natural environment of which pollock is a part. The system is making tangible progress toward acknowledging the array of legal and social perspectives from which fishing activities are viewed and the information needed to test those perspectives and reach the broadest measure of achievement toward meeting management's obligations and opportunities. (p. 119-120).

We must point out that in its current draft form, the PSEIS is fundamentally flawed and fails to meet the requirements of the National Environmental Policy Act (NEPA). We remind you that the agency did not undertake to do the PSEIS; in fact the process is occurring as a result of litigation brought by conservation interests to require the agency to comprehensively evaluate the impacts of fishing on the ecosystem. More importantly, the agency has three times failed in this undertaking and appears to design the analysis to support the status quo. Thus, the team must revise all analysis that relies on the promise of the PSEIS and revise its scores downward as the agency has not demonstrated that will produce a legally sufficient programmatic environmental impacts analysis of the groundfish fisheries.

The following discussion is an excerpt from the comments submitted on the structural flaws in the draft PSEIS by conservation organizations. Please note the following excerpt is a small component of the comprehensive comments submitted by conservation organizations and there are many other specific problems in the PSEIS. The full comments on the PSEIS are also attached.

I. The PSEIS Does Not Satisfy the Agency's Obligation Under NEPA and Is Not Responsive To The Court's Order.

A. The PSEIS Does Not Satisfy the Agency's NEPA Obligation Because the Alternatives Do Not Address the Continued Authorization of Fishing in the North Pacific Region

1. NEPA Background

NEPA is the "basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). Its goal is "to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment." Id. § 1500.1(c). To meet this purpose, NEPA requires that agencies prepare an environmental impact statement (EIS) for all "major Federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(C). An EIS "is more than a disclosure document" and is to "be used by Federal officials in conjunction with other relevant material to plan actions and make decisions." 40 C.F.R. § 1502.1. It is, therefore, "an action-forcing device to insure that the policies and goals defined in the Act are infused into the ongoing programs and actions of the Federal Government." Id.

NEPA requires that an EIS be prepared for major federal actions, including the "[a]doption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of Federal resources, upon which future agency actions will be based." Id. § 1508.18(b)(2); see also § 1502.4(b) ("Environmental impact statements may be prepared, and are sometimes required, for broad Federal actions such as the adoption of new agency programs or regulations."). For those types of federal actions, the agency is required to produce a "programmatic environmental impact statement" (PEIS) evaluating the broad implications of the proposed policy or program changes. The continued management of the North Pacific Region fisheries is such a broad agency action, and the Court has required NMFS to prepare a PEIS.

Whether it evaluates a broad federal program or discrete, site-specific project, the section of an EIS dealing with the comparison of alternatives "is the heart of the environmental impact statement." 40 C.F.R. § 1502.14; see also Idaho Conservation League v. Mumma, 956 F.2d 1508, 1519 (9th Cir. 1992). That section "should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public." 40 C.F.R. § 1502.14. The agency then must "[r]igorously explore and objectively evaluate all reasonable alternatives." 40 C.F.R. § 1502.14(a).

2. The Alternatives Identified Do Not Address the Appropriate Federal Action

"The goals of an action delimit the universe of the action's reasonable alternatives." Citizens Against Burlington v. Busey, 938 F.2d 190, 195 (D.C. Cir. 1990); see also Mumma, 956 F.2d at 1520. "[T]he agency thus bears the responsibility for defining at the outset the objectives of an action," Busey, 938 F.2d at 196, and the agency may not "define its objectives in unreasonably narrow terms." City of Carmel-by-the-Sea v. United States Dep't of Transportation, 123 F.3d 1142, 1155 (9th Cir. 1995). Thus, the agency must identify the federal action being considered and the purpose and need for that action; it then must use that information to develop alternatives. See 40 C.F.R. § 1502.13 ("The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."). It follows, therefore, that the agency must consider alternatives that will satisfy the purpose and need for federal action and that the alternatives considered in an EIS must be alternatives to the proposed course of action.

In this situation, the agency has defined correctly the federal action at issue -- the ongoing management of the North Pacific fisheries -- but it has failed to consider any alternatives to the current course of action. Instead, it has created an artificial statement of purpose -- evaluating alternative policy statements -- and developed unreasonable policy alternatives that cannot fulfill the identified need for federal action. Rather than alternate statements of policy, the agency must consider alternative management schemes for the North Pacific fisheries. Thus, rather than broad statements of policy, the alternatives should be various FMPs.

As the PSEIS correctly states:

In this case, the federal action is a continuing activity: the ongoing management of the groundfish fisheries in the EEZ off Alaska, as authorized by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and pursuant to NEPA and other applicable statutes and executive orders.

PSEIS at 1-1; see also id. at 1-2 ("Rather, the federal action supported by this document is the continuing management of the groundfish fisheries in the EEZ off Alaska."), 2-1 (same). This description of the action under review comports with the Court's remand Order, see Greenpeace v. Nat'l Marine Fisheries Serv., 55 F. Supp. 2d 1248 (W.D. Wash. 1999), and is consistent with the scoping notice issued on October 1, 1999:

NMFS announces its intent to prepare a programmatic SEIS that defines the Federal action under review as, among other things, all activities authorized and managed under the FMPs and all amendments thereto, and that addresses the conduct of the GOA and BSAI groundfish fisheries and the FMPs as a whole.

64 FR 53306.

Thus, the proposed federal action under review is the continued authorization and management of the North Pacific groundfish fisheries under the current FMPs. The PSEIS, however, does not consider alternatives to that action. Instead, the document describes four "policy-level" alternatives:

The restructured alternatives (now four in number) range from a relatively less environmentally precautionary approach to an approach that is relatively more precautionary. Toward this end, each policy alternative offers, to varying degrees, an integrated suite of comprehensive policy goals designed to meet the alternative's specific management or policy objective. To capture the breadth of each policy approach, each alternative (with the exception of the first, *status quo* alternative) contains two hypothetical FMPs that serve as "bookends" to illustrate a range of management actions and potential environmental effects consistent with that alternative policy framework.

PSEIS at 1-9; see also id. at 2-41.

That approach does not comport with the need for federal action identified by the agency and the Court. Indeed, "the ongoing management of the groundfish fisheries" involves much more than a set of policy goals and objectives. It involves the entire suite of conservation and management measures that constitute an FMP. Thus, the agency is required to consider alternatives to the current FMPs, not just the existing statement of goals and objectives.[566]

Indeed, a supplement was needed to update the EIS prepared in 1978 for the GOA FMP and the EIS prepared in 1981 for the BSAI FMP. NEPA regulations require an EIS to be supplemented when "[t]he agency makes substantial changes in the proposed action that are relevant to environmental concerns; or [t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C.F.R. § 1502.9(c)(1); see also Friends of Clearwater v. Dombeck, 222 F.3d 552, 557-58 (9th Cir. 2000) (describing the standards that are used to determined when an SEIS is needed). According to the Court, the agency "seems to have acknowledged that an SEIS was necessary under both the 'substantial changes to the action' and the 'significant new information' prongs . . . ." Greenpeace, 55 F. Supp. 2d at 1271. Nothing has changed in that regard in the new draft:

The need for a "Supplemental" EIS became apparent to NOAA Fisheries during the 1990s, when the agency was apprised of the legal and scientific insufficiency of the initial EISs prepared for the GOA and BSAI groundfish FMPs in 1979 and 1981, respectively. . . . Significant changes have occurred in the resource and its environment over the past 20 years, and the initial EISs supporting the FMPs no longer adequately reflect the current state of the environment. While fishery management regulatory actions and FMP amendments have all been attended by environmental analyses, mainly EAs or EISs, none of those analyses attempted to examine the impact the FMPs in their entirety have had on the environment.

PSEIS at 1-3. Further,

[t]he original EISs for the BSAI and GOA FMPs were finalized in 1981 and 1978 respectively. Although many EAs and several EISs have been prepared for FMP amendments and regulatory actions over the

[566] The agency attempts to remedy this deficiency by identifying the "purpose" of the PSEIS as "analyz[ing] comprehensive policy alternatives in support of the continuing management of the groundfish fisheries of the BSAI and GOA." PSEIS at 1-2. That statement of purpose is unreasonably narrow, not responsive to the Court's remand Order, and does not help the agency evaluate the proposed federal action. Instead, it represents a transparent attempt by the agency to avoid consideration of alternative FMPs. The PSEIS has no purpose other than evaluating the proposed action and alternatives.

ensuing years, none examined the BSAI and GOA FMPs in their entirety or, in other words, at a programmatic level. Since the original EIS documents were developed, major changes have taken place in the technology of the fishing industry, in the allocation of the resources, in the environmental conditions, and in the FMPs themselves. The accumulation of these changes indicated a need for a revision of those initial EISs that would supplement the original analyses and would hence result in a Programmatic SEIS.

Id. at 1-6; see also Decl. of Steven Pennoyer in support of Defendants' Motion for Stay, filed Aug. 10, 1998, at ¶ 3 ("This SEIS will update previous EISs that were completed for these fishery management plans."). Thus, the agency recognizes that the PSEIS is intended to update and supplement the two earlier FMP EISs.

The 1981 BSAI FMP EIS "examines the direct and indirect impacts upon the human environment of the proposed approval and implementation" of the Fishery Management Plan for the Groundfish Fishery in the Bering Sea and Aleutian Islands Area," and has as its purpose an evaluation of the "approval and implementation of the FMP" and alternatives. BSAI EIS at 4, 9. It then analyzes the environmental implications of the proposed FMP as well as alternative management schemes, including lower and higher catch levels, the adoption of various area closures, different reporting schemes, a trawl gear restriction, three separate methods of calculating Optimum Yield, and Prohibited Species management. Id. at 10-34. Similarly, the 1978 EIS for the GOA FMP states that "[t]he proposed action is to implement a preliminary fishery management plan for the foreign trawl fishery" in the GOA. GOA EIS at 1. It evaluates two alternatives to the proposed plan -- one in which there is no plan governing foreign trawl fishing and one in which the plan allows foreign trawl fishing at a rate lower than that allowed by the preliminary draft plan. Id. at 96-97.[567]

"Since the original EISs were prepared, significant changes occurred within the fishing industry and the FMPs for the GOA and BSAI were each amended more than forty times." Greenpeace, 55 F. Supp. 2d at 1270-71. In fact, the current management schemes in the GOA and BSAI are so different than those evaluated in 1978 and 1981, that, effectively, each constitutes an entirely new FMP. Accordingly, an appropriate, comprehensive "update" must consider alternatives similar to those considered in the original EISs. An evaluation limited to alternative policy statements only updates a portion of the decisions made more than twenty years ago. In 1978 and 1981, the Council and the agency understood that an examination of the entire action implemented by the FMPs, and alternatives to those FMPs, was required. No less is required today to update those documents. Indeed, the agency recognizes that "a Programmatic SEIS for the Alaska groundfish fisheries should essentially be a broad environmental review of the GOA and BSAI Groundfish FMPs and alternatives to them." PSEIS at 2-60.

Moreover, the agency will not be able to remedy this deficiency in the future by preparing EAs or EISs for FMP amendments. Indeed, the agency intends to use the PSEIS as an overarching analysis from which to "tier" future amendments to the existing FMPs. See PSEIS at 1-2 ("Any specific FMP amendments or regulatory actions proposed in the future will be evaluated by subsequent EAs or EISs that are tiered from the Programmatic SEIS but stand as case-specific NEPA documents and offer more detailed analyses of the specific proposed actions."). It claims that "[a]ny such amendments and actions will logically derive from the chosen policy direction set for the preferred alternative." Id. This method of management will not satisfy NEPA because there will be no adequate plan-level EIS.

Since the 1978 and 1981 plan-level EISs for the GOA and BSAI groundfish fisheries were promulgated, the only NEPA process with regard to the North Pacific groundfish fisheries has been in response to the annual TAC

[567] This comparison is not intended as an endorsement of the analysis undertaken in those EISs. Rather it simply highlights the fact that, in those documents, the agency did identify correctly the scope of the analysis it should have undertaken.

authorizations and ad hoc amendments to the FMPs. Each of those NEPA documents tiers from one of the original EISs so as to eliminate the need to repeat the analysis conducted therein. The Court and the agency, however, have recognized explicitly that the 1978 and 1981 EISs are no longer sufficient for management of the North Pacific fisheries. See Greenpeace, 55 F. Supp. 2d at 1271. Accordingly, NMFS and the NPFMC no longer can tier from the analysis conducted in those documents. Moreover, just as the intervening amendment-level EAs and EISs have not remedied the deficiencies in the existing plan-level EISs, similar NEPA documents for future amendments to the FMPs will not satisfy the agency's obligation to have an appropriate plan-level EIS in place.[568]

Thus, to satisfy its obligation to update the existing FMPs and to evaluate effectively the "ongoing management of the groundfish fisheries," the agency must consider alternative FMPs. It may not avoid this responsibility by creating artificial, policy-level alternatives.

3. The PSEIS Will Not Result in the Implementation of an Alternative Course of Action

As discussed above, the PSEIS is deficient because it fails to consider alternatives to the "ongoing management of the groundfish fisheries" under the existing FMPs. In addition, however, the PSEIS analysis also is insufficient because it does not help the agency decide currently how to best manage the fisheries in compliance with the MSA. Instead, the PSEIS identifies a series of policy-level alternatives that should guide the agency in the event that it decides to implement changes to the FMPs at some point in the future. While such a policy may be advantageous, it is not sufficient. As explained above, it does not comport with the federal action identified by the agency (the "ongoing management of the groundfish fisheries") and, as explained below, it does not satisfy the Court's direction. More fundamentally, however, such an approach contravenes Congress's intent that the NEPA process help "public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment," 40 C.F.R. § 1500.1(c) (emphases added), and it does not help the agency fulfill its obligation under the MSA to manage the groundfish fisheries.

To foster conservation and effective management of the nation's fishery resources, the MSA requires that each Council develops an FMP "for each fishery under its authority that requires conservation and management." 16 U.S.C. § 1852(h)(1). Those plans, and any amendments thereto, must be approved by the Secretary. Id. Because the groundfish fisheries in the North Pacific region clearly qualify as "fisheries that requires conservation and management,"[569] the agency is required to have a valid FMP in order to continue its authorization and management

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[568] Nor can the agency tier appropriately from the PSEIS as it is constructed currently to plan amendments because there is a step missing in the analytic chain. While the agency may tier from a program-level EIS to a site-specific determination, it cannot tier directly from a program-level EIS to amendment-level EAs or EISs. So, NMFS could tier from an FMP-level EIS (i.e., one that considers alternatives to the FMP) to a NEPA document evaluating the impacts of an amendment to the FMP. Indeed, the agency has used that process for the past twenty years. Similarly, it could tier from a policy-level EIS (i.e., one evaluating alternative policy goals) to a NEPA document evaluating alternative FMPs that might further those policy goals and objectives. It may not, however, tier directly from a policy-level analysis to NEPA documents evaluating the impacts of amendments to FMPs without having in place an appropriate FMP-level EIS. In other words, without evaluating alternatives to the current FMPs, the agency may not appropriately use the policy-level analysis to justify changes to the current FMP.

[569] The MSA defines "fishery" to mean "one or more stocks of fish which can be treated as a unit" and "any fishing for such stocks." 16 U.S.C. § 1802(13). Similarly,

> [t]he term "conservation and management" refers to all of the rules, regulations, conditions, methods, and other measures (A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and (B) which are designed to assure that -
> (i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;
> (ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and

of those fisheries. Thus, at the most basic level, the agency has made a choice already -- it has decided to authorize fishing in the North Pacific region -- and, accordingly, it is obligated under the MSA to have an FMP. It could relieve itself of this MSA responsibility by deciding to ban all groundfish fishing in the region. As it is, however, the agency has continued, and will continue, to authorize and manage fishing in the North Pacific, and, therefore, must have in place a valid FMP.

It is within this decisionmaking structure that NEPA must be implemented. The agency has decided already to authorize fishing in the North Pacific, and, accordingly, it is obligated under the MSA to design an appropriate FMP. The NEPA process is intended to make the agency's choice -- the choice among alternative FMPs -- an informed one and to ensure that the public is included in that decisionmaking process. To achieve those dual purposes, NEPA requires that the agency create an EIS. That EIS "serve[s] as an action-forcing device to insure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the Federal government." 40 C.F.R. § 1502.1 (emphasis added). Thus, "[a]n environmental impact statement is more than a disclosure document" and "shall be used . . . to plan actions and make decisions." Id. "Ultimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork—even excellent paperwork—but to foster excellent action." Id. § 1500.1(c).

The PSEIS fails to meet these mandates because it does not help the agency choose among alternative FMPs. Indeed, the alternatives designed by the agency do not encompass the choices that must be made by the agency or NPFMC under the MSA. Rather, the agency has created a new level of decisionmaking -- a "policy" level that sits "above the line" in its analysis and overarches the FMPs. Standing alone, that sort of overarching policy is not sufficient to satisfy the agency's MSA requirements, was not required by the Court in this case, and does not address the decisions that must be made by the agency in managing the fisheries. Further, the fact that this EIS is intended to be broad in scope and cover the agency's "programs" does not allow the agency to analyze only policy objectives. Rather, the PEIS still must evaluate programmatic choices that are responsive to the decision being made under the MSA to authorize fishing in the region. See 40 C.F.R. § 1502.2(e) ("The range of alternatives discussed in environmental impact statements shall encompass those to be considered by the ultimate agency decisionmaker.").

Moreover, a choice among the four alternatives will not result in any direct, implementable change in fishery management. Rather, the agency has designed the PSEIS purposefully to avoid restricting the Council's discretion in managing the North Pacific groundfish fisheries. The agency may not abdicate its ultimate responsibility to oversee the management of fisheries to the Council in that manner. See 16 U.S.C. § 1855(d) ("The Secretary shall have general responsibility to carry out any [FMP] or amendment approved or prepared by him . . .").

The impotence of the analysis in the PSEIS is revealed by the explanation of the hypothetical "bookends." As the PSEIS states, "the bookends do not reflect the actual specific measures that will be chosen in the future. Rather, they represent the outer bounds of the range of management decisions and measures specific to any policy alternative and serve, also, to provide the basis for a solid scientific analysis of the effects of each specific policy alternative." PSEIS at 2-41; see also id. at 2-42 ("[T]he bookends establish the likely range of management actions the NPFMC will examine . . . ."). Indeed, the PSEIS goes so far as to admit that "[f]indings contained within this analysis could result in FMP amendments that, in turn, could lead to formal rule-making and implementation of changes to the current management regime governing the groundfish fisheries off Alaska." PSEIS at 2-60 (emphases added). By choosing one of the four alternatives, however, the agency does not obligate itself to take

(iii) there will be a multiplicity of options available with respect to future uses of these resources.

Id. § 1802(5).

specific actions but asserts only that any actions it might take in the future likely will fall within the range identified by the "bookends."[570]

Such an analysis does not constitute an adequate evaluation of management alternatives under NEPA. Indeed, the Court required, quite plainly, that "[t]he SEIS will provide reasonable management alternatives, as well as an analysis of their impacts, so as to 'sharply define[e] the issues and provid[e] a clear basis for choice among options by the decisionmaker and the public.'" Greenpeace, 55 F. Supp. 2d at 1258 (quoting 40 C.F.R. § 1502.14) (emphasis added). By definition, a "management" alternative must concern actual "management" changes and must be capable of being implemented. Programs are not mere articulations of policy goals and objectives. See 40 C.F.R. 1508.18 (Defining "Major Federal action" as the "(3) Adoption of programs such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.") (emphases added); see also Ronald E. Bass, et al., The NEPA Book 30 (2001) ("Programs" are the "[a]doption of concerted actions intended to implement a specific policy or plan or that allocate agency resources to a specific statutory program or executive direction.").

These comments do not suggest that an agency may never prepare a PEIS without detailing the precise actions to be taken in each geographic or project area. Indeed, such a requirement would eliminate the advantages inherent in programmatic analysis. Nonetheless, a PEIS must identify strictures within which future agency actions will take place and require that those actions, in fact, are implemented. A useful comparison can be drawn to the programmatic EISs that are prepared to accompany land and resource management plans implemented under the National Forest Management Act of 1976 (NFMA), 16 U.S.C. § 1600, et seq. Such a land management plan "sets logging goals, selects the areas of the forest that are suited to timber production and determines which 'probable methods of timber harvest' are appropriate [but] does not itself authorize the cutting of any trees." Ohio Forestry, 523 U.S. 726, 729 (1998) (internal citations omitted). Thus, a PEIS accompanying such a plan must identify alternatives for each of those parameters -- logging goals, areas of the forest that are subject to timber production, etc. See Mumma, 956 F.2d at 1511-12, 1521-22. Similarly, an appropriate programmatic analysis in the MSA context would, among other requirements, identify alternative "conservation and management measures," allocations of the allowable catch, reporting requirements, essential fish habitat designations, and criteria for designating overfished fisheries. See 16 U.S.C. § 1853(a) (specifying provisions required in an FMP); see also Greenpeace, 55 F. Supp. 2d at 1255 ("The FMPs typically contain a high level of detail concerning all the variables involved in fishing, including Total Allowable Catch (TAC) limits for targeted species, time and area closures, gear restrictions, bycatch limits of prohibited species, and allocation of TACs among vessels delivering to different types of processor groups, gear types, and qualifying communities.") (internal quotation omitted). In this case, the PSEIS does not identify any such direct limitations to be put in place or actions to be taken to meet the policy goals identified.[571]

B. The PSEIS Does Not Comport With the Court's Order

The Court rejected NMFS's first PSEIS because it was too narrow in scope. It held specifically that the agency could not limit its analysis to alternative TAC setting processes. The Court found, first, that, although they might be ambiguous, the scoping notices indicated that the PSEIS would encompass more than just the TAC setting process.

[570] The PSEIS does state that "[o]nce the NPFMC and NOAA Fisheries choose a policy-level alternative (and accompanying bookends), it will be committing, to the extent practicable, to devise and implement FMPs and management actions consistent with the goals and objectives of that chosen alternative." PSEIS at 2-42. Nowhere, however, is this statement explained, and there is no description of what those "FMPs and management actions" might be. Instead, the PSEIS simply asserts that the agency's "approach to developing the programmatic alternatives sets a distinct course for decision-making." Id. at 2-41. In fact, the policy choice made by the agency does nothing of the sort; it simply provides a set of boundaries within which management techniques, if implemented, may fall.

[571] To compound its error, the agency also fails to consider an appropriate range of alternatives. Policy Alternatives 1 and 3 are indistinguishable from the Preliminary Preferred Alternative, and Policy Alternatives 2 and 4 do not present an adequate or concrete range of possible choices.

Greenpeace, 55 F. Supp. 2d at 1273 ("[T]he weight of the language pointed to a broader scope."). In addition, however, the Court stated explicitly that

a narrow SEIS dealing only with TAC levels would not satisfy NEPA. The FMPs involve "a myriad of interrelated regulations to manage the fisheries." In light of the significant changes to these FMPs and the new information about the broad range of issues covered by these regulations, the Court concludes as a matter of law that NEPA required a broad programmatic SEIS in order to fairly evaluate the dramatic and significant changes which have occurred in the GOA and BSAI groundfisheries.

Id.

The Court went on to criticize the TAC-only approach because it did not "'sharply [define] the issues and [provide] a clear basis for choice among options' related to the FMPs" and did not "help future decision-makers assess whether the fisheries should continue to be conducted under the current structure of the FMPs, or whether other alternatives would be more beneficial." Id. at 1274. The Court quoted approvingly from the EPA's final comments on the SEIS, which

correctly note that NEPA's requirement that NMFS "rigorously explore and objectively evaluate all reasonable alternatives," dictates

inclusion of more comprehensive alternatives which look at and programmatically address all elements of the FMP (i.e. location and timing of each fishery, harvestable amounts, exploitation rates, exploited species, groupings of exploited species, gear types and groupings, allocations, product quality, organic waste and secondary utilization, at-sea and on-land organic discard, species at higher and lower trophic levels, habitat alterations, and relative impacts to coastal communities, society, the economy, and the domestic and foreign groundfish markets) and varies TAC levels outside of the present status quo range.

As written, however, the SEIS does not provide decision-makers with any way of assessing the trade-offs between gear-restrictions and bycatch, for example, or the way that the timing of the various fisheries interact.

Id. at 1274-75 (emphasis added).

The new policy-only approach does not remedy these deficiencies because it does not allow agency decisionmakers to choose among alternative management schemes. Indeed, the new PSEIS is flawed in a manner directly parallel to the first attempt; NMFS simply has exchanged a PSEIS with alternatives that focused only on the TAC-setting process for one focused solely on statements of policy and goals. In so doing, the agency has repeated the same mistake it made in the first attempt by "focusing narrowly on one aspect of" the FMPs. Id. at 1276. Thus, this PSEIS is deficient for the same reasons identified in the Court's Order with regard to the TAC-only approach. See id. at 1274 ("For the same reasons, NMFS cannot then break the FMPs down 'into small component parts' by analyzing only the setting of TAC levels rather than these FMPs in their entirety.").

Moreover, the analysis of potential impacts to the environment from implementing the hypothetical "bookends" does not render acceptable the agency's choice to limit the alternatives to statements of policy. Indeed, it was "[t]he Court's determination that the SEIS must be treated as a broad, programmatic analysis of the FMPs as a whole [that led] directly to its conclusion that the range of alternatives considered was inadequate." Id. Thus, regardless of the impacts analysis, the Court clearly expected the agency to consider alternatives comprised of complete FMPs.

II. The Chosen Baseline and Cumulative Impacts Analysis are Inappropriate Because the PSEIS Fails to Consider the Impacts of the FMPs Themselves.

A second major deficiency in the PSEIS is the lack of a comprehensive evaluation of management under the existing FMPs since they were implemented more than 20 years ago. The PSEIS does attempt to analyze the impacts of the numerous amendments to the two FMPs, but it never provides an assessment of the impacts of the FMPs themselves. To remedy this failure, NMFS must either include a comprehensive discussion of these effects in its cumulative impacts discussion, or change the baseline for its impacts analysis so that it begins when the FMPs were promulgated.

NEPA requires that the agency evaluate the cumulative impacts of the proposed action. PSEIS at 4.1-24. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." 40 C.F.R. § 1508.7. These impacts, along with the more direct impacts on the environment from each alternative, are evaluated against a baseline description of the potentially affected environment. See PSEIS at 4.4-1.

In the PSEIS, NMFS has chosen the current state of the fisheries as this "comparative baseline." Id. (stating that the PSEIS compares alternatives to the state of the affected environment in "2002 for physical and biological resources, and 2001 for socioeconomics"). As it is described in the PSEIS:

The baseline does not represent a static 'snapshot' of the resource. Instead, it represents the trend of the resource, incorporating the past history of influences on the resource. The cumulative past effects of groundfish fishery activity, as well as effects external to the groundfish fishery such as other fishery impacts, human-induced impacts or climatic events influencing the resource, all contribute to the state of the baseline condition.

PSEIS at 4.4-1. This baseline is described in more detail by tables summarizing the descriptions of the affected environment as provided in Chapter 3 of the PSEIS. See id.

The choice of a particular point in time as the comparative baseline for an ongoing management scheme obligates the agency to evaluate the cumulative impacts of its past management practices. Thus, in order to render appropriate its choice of the current state of the fisheries as the comparative baseline, NMFS must undertake an evaluation of the cumulative impacts to the fishery, environment, and other resources that have occurred since the prior NEPA process. In that time, there have been impacts and changes caused by environmental factors, the fisheries themselves, and amendments to the FMPs. The PSEIS presents only a cursory overview of the numerous amendments to the GOA and BSAI FMPs since the original EISs were prepared. PSEIS at 3.2-1. Although the Court clearly required such an analysis, see Greenpeace, 55 F. Supp. 2d at 1274 ("The Court has no doubt that the vast changes to the FMPs have reached the threshold of 'cumulatively significant impact on the environment,' thereby requiring preparation of an SEIS addressing these vast changes."), an evaluation of the effects of the FMP amendments alone does not satisfy the cumulative impacts requirement.

Rather, the evaluation of "Internal Events and Actions," for each fishery resource must contain an analysis of the impacts of the fisheries, as managed under the existing FMPs, since the earlier NEPA documents were finalized. Those assessments should begin with the state of the resources in 1981 (or 1978) and explain the impacts of FMP-governed fishing since that time. Indeed, the Court found that NEPA "requires NMFS to analyze the ways in which the groundfisheries effect the North Pacific ecosystem, and to provide decisionmakers and the public with a document that will help further informed decision-making as to the consequences of these plans." Id. at 1276. Thus, it held that that NEPA required more than just an analysis of the amendments to the FMPs, but also the "creation of a document that thoroughly analyzed the cumulative effects of the FMPs" themselves. Id. at 1273 (emphasis added).

Similarly, NMFS recognized in its statement of need for an SEIS, that a comprehensive evaluation of management under the existing FMP framework was lacking. See PSEIS at 1-3 ("While fishery management regulatory actions and FMP amendments have all been attended by environmental analyses, mainly EAs or EISs, none of those analyses attempted to examine the impact the FMPs in their entirety have had on the environment."). The PSEIS should contain such an analysis and does not.

That failure renders the impacts analysis insufficient. In particular, the cumulative effects are measured against the current state of the environment without proper consideration of changes that may have resulted from the past twenty years of management.

Further, the lack of a comprehensive evaluation of the impacts of fishing under the existing FMPs renders improper the choice of 2002 as the baseline. As noted in the PSEIS:

As part of the programmatic review of the groundfish fisheries, however, it is necessary to review the cumulative impacts of the groundfish fisheries on the human environment, including both the incremental impacts of the FMP amendments, and the impact of groundfish fishery management in addition to other past external impacts on the environment affected by the groundfish fisheries, in order to establish a baseline condition against which to compare the Programmatic SEIS alternatives for direct, indirect and cumulative effects.

Id. at 3.2-1 (emphasis added). Thus, the agency cannot evaluate effectively the future impacts of management decisions without understanding how management under the FMPs has affected the resources over the past twenty years. It cannot choose to begin its comparison at some arbitrary point in time without presenting an accurate picture of the changes in the resource caused by the existing management scheme prior to that point. In order to use 2002 as the proper baseline from which to compare alternative policies, therefore, the agency must undertake a comprehensive evaluation of the effects of management under the current FMPs.[572]

d. The team improperly views the litigation that has occurred in evaluating Principle 3.

The draft determination notes the following regarding the extensive litigation that has occurred against NMFS in the North Pacific:

It is relevant to note that NMFS and the North Pacific Council have made important changes because federal courts or the U.S. Congress have told them to. One might wish that the history of institutional change had followed a more congenial path if only because it seems so obvious in retrospect that some fights were not worth having when compared to the other purposes toward which human energies could have been directed. But the reason for change is ultimately less important than the fact of it. And the fact is

[572] Further, NMFS has not fulfilled its obligations when confronted with uncertain information. If there are information gaps, the agency is required to obtain the missing information if "the overall costs of obtaining it are not exorbitant." 40 C.F.R. § 1502.22(a). If the costs are exorbitant, NMFS must provide: (1) a statement that the information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information; (3) a summary of the existing, relevant scientific evidence; and (4) the agency's evaluation of the potential adverse impacts based upon theoretical approaches or research methods. Id. § 1502.22(b). In this case, NMFS appears to assume that the costs of obtaining all missing information would be exorbitant, but it then fails to comply the second part of the regulation. Indeed, there is estimation of the relevance of missing information or summary of existing, credible scientific evidence. These failures to evaluate the significance of these readily apparent holes in the agency's science render insufficient NMFS's evaluation of the potential adverse impacts of its actions.

that the pollock fishery management system is improving in fundamental, vital, and precedential ways. (p. 120).

We disagree that in evaluating the management system under Principle 3 that the "reason for change is ultimately less important than the fact of it." We find it very significant that in cases of protecting resources that impact the fishing industry, the agency and Council have been resistant to take proactive measures. The system does not contain internal checks and balances that ensure correct decisions are made in favor of sustainability, including conservation of species and habitat. Agency resistance to conservation measures and inaction to protect vulnerable species and habitats has caused extensive litigation and continues to be evident in its failures to prepare an adequate PSEIS. Management responses to these issues too often occur only after the federal court has forced the agency to comply with legal mandates. Even then the industry and their political allies have gone to Congress to request legislative measures more palatable to the fishing industry and the Council than those contemplated by agency processes that result from court orders.

It is incorrect and inappropriate for the team to view the litigation as an acceptable means to the end that as long as the "pollock fishery system is improving in fundamental, vital and precedential ways," it is of no consequence that litigation was the reason for the movement in that direction.[573] Instead, the team should view litigation through the lens that it represents serious problems in the management system. The team should find significant and troubling the fact that litigation was the precipitating factor that caused any positive change in the management of the pollock fisheries.

2. Problems with Principle 3 PIs and conditions

The following comments address our concerns with specific PIs and conditions under MSC Principle 3.

PI 1.1: The management system incorporates and applies an adaptive and precautionary exploited stock strategy [Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]
The report asserts that "there is no question that the stock assessment performed for the pollock fisheries is among the world's very best." (p. 139). However, under Principle 1, the report notes that some elements of the HCRs need further testing and possible modification. The team also recognizes that, as pointed out under Principles 1 and 2, the level of incorporation of ecosystem considerations into the estimates of ABCs needs improvement to be precautionary. (p. 139). Regardless of these serious concerns, the team scored this PI above the 80 SG level.

The 80 SG level requires that the "harvest strategy, including catch control rule, is explicitly precautionary." The most recent stock assessment states that the GOA pollock stock estimate of spawning biomass is 177,070 t, which according to NMFS is "28% of unfished spawning biomass and below *B40%* (240,000 t), thereby placing Gulf of Alaska pollock in sub-tier "b" of Tier 3." Despite the low abundance, at the December meeting the Council set a pollock limit of 71,260 tons, up 31 percent from 2003. When stocks abundance is down and there is considerable uncertainty as to the cause, the precautionary principle dictates that a more conservative harvest level be adopted, if any is to be set at all for a stock that is below MSY. Clearly, the current harvest strategy and HCRs are not explicitly precautionary. As such, the team must score the fisheries at the SG 60 level for this PI.

[573] We dispute that the "pollock fishery management system is improving in fundamental, vital, and precedential ways" when the management approach currently includes less protection for Steller sea lions than existed two years ago.

Further, the harvest strategy fails to account adequately for the needs of pollock predators in the GOA ecosystem. The North Pacific groundfish FMPs define overfishing levels and sustainability with respect to the Magnuson-Stevens Act standard of maximum sustainable yield (MSY), a simplified production theory which regards any fish production above the level required (in theory) to maintain spawning stock at a given target size as "surplus" for the fishery. (PSEIS, ES-66.)

To compensate for the ecological deficiencies of MSY, overfishing guidelines must be modified to account explicitly for the roles of target species as prey for other fish, marine mammals and birds, as well as the unique life history characteristics, habitat needs and scientific uncertainties that make target species vulnerable to conventional MSY levels of fishing mortality. Fishing levels should be set in a highly precautionary manner to preserve ecological relationships between harvested, dependent and related species. The TAC-setting process should contain procedures and requirements to reduce maximum allowable levels of fishing under the conventional "single-species" MSY rules to an Optimum Yield (OY) level that addresses both the cumulative effects of fishery-maximizing exploitation strategies that are designed to out-compete the other parts of the ecosystem, and local-scale impacts of spatial/temporal concentration of fishery catches.[574] Fishing for important forage species should be reduced to more precautionary levels to maintain the forage base for predators at high levels of abundance relative to the unfished condition as is done under the Convention for the Conservation of Antarctic Living Marine Resources (CCAMLR), which sets the harvest policy for important forage species such as krill (Euphausia superba) at $F_{75\%}$ in an effort to take the needs of predators into account.[575]

Fishery stock assessments do not assess the spatial distribution of stock biomass, the movement of fish over the course of the year, or the spatial and temporal effects of fishing. ABCs are set at the area-wide scale of the "stock as a whole" and on a start-of-year basis (PSEIS VIII, F-2-30), but fisheries concentrate effort in highly productive areas and times of high catch per unit of effort (CPUE), for economic reasons. Spatial/temporal concentration of fisheries increases the risk of overfishing and adversely impacting reproductive success of target stocks, their habitats, and dependent and related species. PSEIS IV, 5-15, 16; PSEIS II, 4.5-280; Appendix F-2, 3, 4. The TAC-setting process should include procedures to evaluate and address the spatial/temporal dimensions of fishing impacts explicitly, recognizing the limits and imprecision of available information. This address this issue, the FMPs should adopt an explicit policy of spatial and temporal management of TACs, based on mgmt objectives for target, non-target and protected species, and habitat protection.

Uncertainty factors should be incorporated systematically into ABC/TAC-setting to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways. The overall approach reflects a policy objective to maintain a large margin of safety in recommending acceptable biological catches in an environment where uncertainty is all-pervasive and even the best available scientific information is frequently full of unknowns.

If the system were sufficiently precautionary, in Tiers 1-3, the management would set the target fishing rate at $F_{75\%}$ as an ecosystem proxy and set MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics)

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[574] Concerning ecological factors, the National Standard Guidelines give the scientific advisors and managers wide latitude to reduce the allowable fishing rates from the theoretical maximum level: "Examples are stock size and age composition, the vulnerability of incidental or unregulated stocks in a mixed-stock fishery, predator-prey or competitive interactions, and dependence of marine mammals and birds or endangered species on a stock of fish. Also important are ecological or environmental conditions that stress marine organisms, such as natural and manmade changes in wetlands or nursery grounds, and effects of pollutants on habitat and stocks." (NMFS 1998, 63 FR 24232).

[575] R.B. Thomson, D.S. Butterworth, I.L. Boyd, and J.P. Croxall. Modeling the Consequences of Antarctic Krill Harvesting on Antarctic Fur Seals. Ecological Applications, 10(6), 2000, pp. 1806-1819: "The Commission for the conservation of Antarctic Marine Living Resources (CCAMLR) takes the needs of krill into account in an indirect manner when recommending the annual krill catch limit. This is done using a single species model to estimate the size of the krill population (relative to its pre-exploitation size) after a 20-yr period of harvesting at a given intensity. The level of harvesting intensity is adjusted until the median krill spawning biomass is predicted to be 75% of its median pristine size."

for important target prey species such as pollock. It would include explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, and adverse local or regional impacts to species and habitats. For target species managed in Tiers 4-6 because there is not adequate information to estimate biological reference points (BRPs) and minimum stock size threshold (MSST), the management should not authorize any directed fishery TAC level until data is available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Management should designate stocks in these tiers as bycatch-only status and require full retention and utilization of bycatch species in Tiers 4-6 as a data collection measure to improve target species management.

The management should incorporate systematically uncertainty factors into setting ABC and TAC levels to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways. This can be accomplished as follows:

- factor species-specific survey coefficient of variation (CV, the error bounds around biomass point estimates) into calculation of ABCs, e.g., using average CV of survey biomass estimates in time series and compute lower 90% confidence interval as fraction by which to reduce max F_{ABC}
- set ABCs on lower 90% confidence limit of model estimate for $F_{X\%}$ rather than midpoint (50%) of the range of probability (i.e., require higher confidence in ABC estimate)
- adopt decision rules that limit the fishing rate to no greater than $F_{75\%}$ for species w/key ecological roles, vulnerable life histories, and situations of high uncertainty
- adopt $B_{40\%}$ (or higher, depending on life history characteristics) as a limit rather than a target (i.e., MSST) with linear reduction in F rate below $B_{50\%}$ to F = 0 @ $B_{40\%}$
- no directed fishing is allowed for species for which no data exist to calculate BRPs and MSST
- employ spatial and temporal dispersion of TAC to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species & habitats
- basin-wide network of closure areas, including spawning area closures and gear closures to prevent habitat damage and act as hedge against multiple uncertainties
- expand research to obtain biological reference points, improve knowledge of species' life histories and habitat requirements, role in the food web, etc.

<u>PI 1.2</u>: The management system incorporates and applies an effective strategy to manage ecological impacts of fishing [Relates to MSC Criteria 3.2, 3.7, 3.9, 3.10]

The report finds that management system's use of ecosystem-based approaches is an area where objective-setting could be significantly improved, particularly in terms of how planners incorporate ecosystem objectives into fishery management plans and into the calculation of ABCs. (p. 140). The team believes that the management system "demonstrates a good and improving ability to present various types of ecological information," but that management is "problematically slow to incorporate relatively well developed ecological information and, more important, has not demonstrated a robust commitment to assessing--in a scientifically creditable way--the ecological impacts of the fisheries." (p. 144). To address these issues, the team requires the fishery to:

Meet the requirements for conditions under Principle 2, Indicator 2.3.1 that requires the fishery to demonstrate its ability to perform ecosystem-based management by designing and performing scientifically creditable tests of the ecological impacts of the fishery on Steller sea lion foraging;

and

Follow the requirements under Principle 2, Indicator 1.1 that call for incorporation of specific ecosystem management considerations and goals into the development of ABCs for the fishery for presentation to the SSC and to the North Pacific Council.

Please see our comments on Principle 2, PI 1.1 and PI 2.3.1 for our concerns with the analysis and conditions under those PIs. In addition, see our comments above for Principle 3, PI 1.1 to understand our serious concerns about the management system's lack of an effective strategy to manage the ecological impacts of fishing. The scoring for this PI should be at the 60 SG level.

PI 1.3: **The management system incorporates and applies an effective strategy to manage the socioeconomic impacts of the fishery [Relates to MSC Criteria 3.2, 3.4, 3.6, 3.7]**
The report points to the GOA FMP amendments that have economic implications to achieve fishery management goals. (p. 146). The report finds the "most sweeping management changes attuned to social and economic rent sharing were the inshore/offshore amendments to the GOA FMP." (p. 146). The report states that Amendment 23 allocated 100% of the directed GOA pollock fishery to catcher vessels delivering inshore and that this fleet is "more tied to fishery dependant communities." (p. 146). The team was concerned by the apparent inadequate consideration of and responsiveness to the fisheries' impacts on the social and economic interests of certain Native Alaskan communities that are dependent on sea lions, salmon and halibut that the fisheries take or impact. (p. 147).

The report fails to discuss that the GOA pollock fleet is overcapacity and the economic impacts of that problem, as evidenced by the current evidence of attempts to rationalize the fishery. In addition, it is misleading to create the impression that because smaller boats than factory trawlers are used to fish pollock in the GOA, that economic rent from the fishery is shared by communities historically dependent on pollock as required by the 80 SG level. While the GOA fleet processes in Kodiak, the boats and crew are largely from outside Alaska.

In addition, at the 80 SG level, the fishery management system is supposed to provide for "long-term predictability or other risk management and hedging tools needed for rational and prudent investment." The low GOA pollock stock size does not demonstrate the Council and NMFS have provided for long-term predictability. Further, the recent decision to increase the GOA pollock quota 31 percent despite the fact the stock estimate is near its lowest point seen in the last 30 years does not demonstrate the utilization of risk management and hedging tools needed for rational and prudent investment. Indeed, it represents just the opposite of what the SG 80 level contemplates. As such, this PI should be scored downward.

PI 1.4.1: **There is a research strategy to support the harvest strategy and to address information needed to support the identification and mitigation of ecosystem impacts [Relates to MSC Criterion 3. 8]**
The report notes that the pollock fisheries benefit from significant research support and there has been dramatic increases in federal funding available for research in recent years. The team states that it would have scored this PI higher but for the following concerns:

- that research funding will almost certainly decline, frustrating long-term efforts to improve understanding of the fisheries' impacts.
- the management system has not demonstrated a robust commitment to development or use of fundamental information concerning the fisheries' impacts on the ecosystem.
- the process by which research planning occurs, and the standards applied to grant credence to research results, are less than fully objective as a scientific matter, and somewhat unstable. (p. 150).

Despite these concerns, the team scored the fisheries above the 80 SG level. The team should score this PI downward because as the team's concerns demonstrate, the research strategy fails to comply with the following provisions as required by the 80 SG level:

- stable, well-led, diverse and objective research planning organization
- funding to support near-term research needs
- evident progress in scientific understanding related to target and impacted species
- evident application of scientific understanding to harvest strategy
- evident progress in scientific understanding related to ecosystem impacts of fishery
- evident application of scientific understanding to strategy for managing ecological impacts of fishing

PI 2.2: The fishery is managed and conducted in a manner that respects domestic law [Relates to MSC Criterion 3.16]

We have asserted since the assessment process began that the pollock fisheries should not be considered for certification because of their central role in the litigation to protect Steller sea lions and the ecosystem from adverse fishery impacts. As an initial matter it seemed elemental that a fishery should not even be considered for certification when it is being conducted in violation of laws designed both to protect the environment and to allow humans to understand a fishery's impacts on the environment. Given that the team chose to conduct this assessment, we urged you to recognize the central role the legal situation must play in your decision whether to certify the fisheries. Amazingly despite the litigation history and numerous federal court findings that NMFS was violating both the Endangered Species Act and the National Environmental Policy Act, coupled with NMFS's own finding that the pollock fisheries are jeopardizing the existence of Steller sea lions and adversely modifying their critical habitat, the team has determined that these fisheries are sustainable and well managed and recommended the MSC certify them.

The report states in the beginning of the analysis of this PI the following:

It bears explaining that the assessment team's consideration of this indicator is particularly influenced by the team's threshold decision to consider the fishery management system to include, among other elements, the United States' federal courts, as well as the National Marine Fisheries Service. The team's analysis, thus, approached questions of "legal compliance" and "respect for law" from the perspective of the inter-related behavior of the various components of the system, especially the interaction of the courts and NMFS. Legal scholars, psychologists, and political scientists actively study how agency decision-making is affected by judicial review. The literature reveals strong disagreement on the question whether judicial review improves or impairs the quality of agency action, but there is no disagreement that agency rules, meaning in this case the way the pollock fishery is actually managed, ultimately manifest the energies and influences of the agency and the courts carrying into motion the statutory directives of the Congress. (p. 153, fn 44 (citations omitted)).

As discussed in these comments at the beginning of the section addressing Principle 3, we strongly disagree with the team's threshold decision to consider the management system to include the courts. We urge the team to revise the definition of the management system to include only NMFS and the Council. Adopting this definition clearly impacts the analysis under this PI and requires the score to fall below the 60 SG level.

We have a number of concerns with the analysis and the condition under this PI. Primarily the analysis recognizes the serious legal problems the management has experienced and its historic inability to comply with federal environmental laws. However, in the end, the report fails to score this PI consistent with the gravity of the recognized problems. Below are some of the significant issues raised by the team that a downward score.

The team notes with concern that NMFS' receptivity to and use of the newly reported sea lion tracking data in the 2001 BiOp gives the impression that the management employed a less rigorous standard of scientific proof and conservatism than the standard normally applied to new research results or other information submitted in connection with management of the fishery. The report recognizes that the federal court upheld the conservationists' challenge to the 2001 BiOp on that very ground and ordered NMFS to prepare the analysis missing from the 2001 BiOp. In response, the report states "It is among the most worrisome signs of failure to respect domestic law that an agency would not properly analyze or explain the basis for a major decision on a controversial matter that the agency had litigated and lost before, meaning, in this case, sea lion conservation. NMFS itself has testified before the U.S. Congress that the agency is well aware that it has a chronic problem successfully meeting the terms of NEPA and the ESA and that the courts were taking a dim view of the agency's administration of the law (Hogarth, 2002)." (p. 157).

The report states that the "evaluation team's perspective on this indicator is heavily influenced by the equivocal impression given by NMFS officials interviewed by the evaluation team concerning the agency's determination to take measures in-house to improve its ability to meet the terms of those laws. In brief, some officials clearly believe that the agency's compliance problem results from bad laws, hostile stakeholders and litigants, unreasonable judges, or all of them together. Other officials assign fault to the agency's complex internal structure, diverse and evolving mission, and limited resources." (p. 158).

The team finds it important that the parties to the litigation to protect Steller sea lions "recently agreed to settle pending litigation on terms that have been adopted by the federal court and entered as an order to the parties, effective April 1, 2003." (p. 158). The order covers all of the significant NEPA and ESA compliance matters that have been the subject of the litigation and requires NMFS to bring the groundfish fisheries management into full compliance with these laws (as to the issues under litigation) within certain timeframes set for 2003 and 2004. It is incorrect to characterize the plaintiff's dismissal of the lawsuit as a settlement because no settlement occurred in the case. The agency defended its compliance with federal environmental laws throughout the entire lawsuit over many years. The plaintiffs won on the claims they raised throughout the duration of the case. The plaintiffs dismissed the case to give the agency the opportunity to bring its management of the groundfish fisheries into full compliance with NEPA and the ESA pursuant to the outstanding court orders comply with the law without litigating. So far it appears that the agency is failing in the effort to comply with the law as the draft PSEIS and the Addendum to the October 2001 BiOp are both legally deficient and vulnerable to challenge in court.

The analysis of this PI is one of the places in the report where the team refers to the promise of the PSEIS as an analytical resource that will support better-informed and even more successful management of the pollock fisheries. While that is clearly the goal under NEPA, the revised draft PSEIS is flawed and will fail to meet the requirements of NEPA unless it is changed significantly in the final version. Contrary to the hope expressed by the team, the draft PSEIS fails to be a useful tool to integrate ecosystem, listed species, habitat and other considerations fully into the fishery management planning process.

The report recognizes that

the agency has not yet completed the work ordered by the court and a great deal of difficult work and decision-making remain to be done. NEPA does not require decision makers to make good decisions about implementing the Magnuson-Stevens Act or ESA; it simply requires that they have the information to do so if they choose to. The pattern of past compliance difficulties raises the question whether the management system will indeed perform its obligations in a manner that shows the measure of respect for domestic law contemplated by this indicator. (p. 159).

The report fails to recognize the significant problems with the Addendum to the October 2001 BiOp. This Addendum fails to adopt conservation measures that protect the full scope of SSLCH, and the prey field outside of CH, much like the agency recommended in the 2000 FMP BiOp. The Addendum should have included the general approach of large-scale habitat protections coupled with an experimental design that permits limited fishing in some areas of critical habitat consistent with the approach adopted by the agency in the 2000 FMP BiOp and the general approach recommended by the NRC. Please see the attached comments on the Addendum to understand the problems with this document.

Despite the report's conclusion that it is an open question whether the agency will meet its legal obligations to show respect for domestic level as required by this PI, the team scores this PI above the 60 SG level. The team requires the following condition to meet this PI:

[T]he fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy. The fishery must, in particular, meet the terms of the Order dated April 1, 2003, which sets specific deadlines in 2003 and 2004 for completion of ESA- and NEPA-related analyses and procedures. That Order requires NMFS to revise its 2001 Steller sea lion biological opinion not later than June 30, 2003 and to issue the final PSEIS (and a decision based on the analysis) not later than September 1, 2004.

The evaluation team advises that it will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species unless the impacts of those activities on listed species are analyzed and documented in a manner consistent with the high standards of scientific technique and public involvement of which the fishery management system is capable. The scoring of this indicator will be revisited, and likely revised downward, if a court finds that the fishery is being managed in a manner that fails to comply with any significant provision of applicable law, whether or not the issue in question has been the subject of prior disputes.

The first part of the condition fails to add any new requirement to the already existing legal requirements as set out in the April 1, 2003 court order. Regarding the statement in the second part of the condition that the team "will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species," the team must require NMFS to provide immediately this information to determine if harvest regimes for the upcoming fisheries will allow catch in SSLCH.

The team should have scored this PI below the 60 SG level. The 60 SG provides:

- The management system fails to reliably monitor and assure its compliance with all substantive and procedural aspects of applicable domestic law.
- Harvest management decisions made by fishery managers are regularly overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law.

These bullets exemplify perfectly the management system situation in the North Pacific. As such, the team clearly erred in assigning this PI a score higher than 60. However, if the team continues to score the fisheries above the 60 SG level and require a condition, given the significant legal compliance problems to date, the team should require management measures that require more precaution. This includes reduced ABC and TAC levels, including adequate consideration of uncertainty, and no trawl fishing in SSLCH.

PI 3.1: The management system solicits and takes account of relevant information [Relates to MSC Criterion 3.2]
The report states that "there is no doubt that the management system solicits, develops and considers very large amounts of ever-changing information with regard to the pollock fisheries."[576] (p. 163). However, the team finds

recurrent instances of resistance at all levels of the management system to information, advice, and opinions provided from outside the scientific and management community, especially if these embraced constraints on harvest levels. Similarly, the team observed that the management system has turned aside advice or information that has subsequently been vindicated (and imposed on the management system) by judicial opinion. The evaluation team is troubled by evidence of instances where the management system does not resolve matters of scientific uncertainty in favor of protected or endangered species, in contradiction to the purpose of the relevant legislation and a considerable body of directly relevant jurisprudence. The team was surprised and troubled to find that many influential participants in the management system were fully aware that populations of certain animals potentially affected by the fishery are declining sharply, but expected that the management system would take no action to conserve the animals until their populations drop far enough to fall within the scope of the Endangered Species Act. (p. 163).

The team finds that the infirmities of the Council process are "characteristic of agency behavior and may be inherent (albeit not beyond remedy) in the dynamics of decision-making by any group of human beings." (p. 163).

To address the problems with this PI, the team requires the following condition:

the fishery must take affirmative steps to ensure that information and opinions submitted by stakeholders who do not represent the interests of the commercial fishing industry are given fair, professional, and transparent evaluation at all levels of the management system. The evaluation team requires that the management system commission an independent evaluation of the manner in which non-industry stakeholder information and opinions have been addressed in a representative set of circumstances identified by stakeholder interests. The evaluation should identify opportunities for procedural and substantive improvements, including measures to provide greater transparency and accountability to the process. The evaluation team believes that the North Pacific Council and NMFS both would benefit from a candid evaluation of the quality and character of the procedures and practices by which the various layers of the management system invite and accommodate information that challenges the status quo. The management system should consider this type of inquiry to be fundamental to achieving continual improvement in the quality of its management practices and, thus, its service to the public. (p. 166).

This condition fails to require the management to take any actions as a result of the independent evaluation's findings to institutionalize the fair consideration of information provided by non-fishing industry stakeholders. While

[576] Here is another PI where the team points to the promise of the PSEIS process. As discussed in the beginning of the section on Principle 3, the draft PSEIS has fundamental problems.

the analysis under this PI recognizes that there are serious problems with the management being open to information presented, it fails to give adequate weight to the management's lack of receptivity to information that would counsel toward employing more restrictive management measures. The Council and NMFS solicit information from the public largely as a pro forma exercise, but appear not to consider meaningfully information that is unfavorable to the fishing industry or the Council's reputation as "best managers." Examples include the lack of management response to the increased catch in SSLCH, to setting MSST levels, to evaluating differential gear impacts on Steller sea lions, and to establishing EFH and HAPCs. In addition, the existing management process has no procedures to address the effects of fishing on protected species, habitat and their prey. This is a critical gap which must be formally addressed to ensure that deleterious impacts from fishing do not occur. As noted elsewhere in the draft determination, the management fails to incorporate information from the Ecosystem Considerations chapter of the SAFE report into stock assessments and management processes. In essence, the management has operated under crisis management, making changes in response to litigation, rather than to consider seriously comments made by conservation stakeholders and avoid litigation.

The team should revise the score downward to 60 SG level. As recognized by the team and discussed above, "The management system presents significant overt or implicit resistance to introduction or consideration of new information that is potentially relevant to the management of the fishery." This complies with the 60 SG level.

PI 3.2: The management system involves all categories of stakeholders appropriately on a regular, integral, explicit basis [Relates to MSC Criterion 3.2]

The report finds the management system to be very open and includes numerous mechanisms to encourage participation by all interested stakeholders.[577] (p. 169). The team states that it would have assigned a much higher score for this PI "if it were not so clear that the system has yet to fully accommodate conservation stakeholders." (p. 169). The report finds

> the evidence is strong that the system's present inability to enfranchise their concerns as an integral part of the management process has produced instability and unpredictability in the management system, and consumed huge amounts of time, attention, and funding in a quest to resolve those concerns after the fact. It is also evident that the instability in the management system generally attributed by the industry and some agency personnel to the actions of the conservation stakeholders is closely matched by the instability and unpredictability attributable to the actions of commercial fishery interests through their invocation of the federal legislative process to address conservation, allocation, and other issues. (p. 170).

The team did not require any conditions to address the problems under this PI, but recommends that in appointing people to the Council, SSC, AP and ad hoc groups, there be a "more forward thinking and practical approach to identifying and including persons with demonstrated experience in understanding and incorporating conservation community concerns into traditional management systems." (p. 170).

The analysis under this PI fails to give sufficient weight to the fact that the Council fails to meaningfully involve all categories of stakeholders in the issues it considers. At all levels of the process, there is insufficient representation of conservation interests; this is evident considering that there are no designated Council seats for representatives of non-consumptive interests, and there is an extreme imbalance on Council committees toward fishing industry interests over conservation concerns. The most blatant example of the Council's lack of meaningful involvement and

[577] Note that this is another place in the report where the team finds the PSEIS process "holds the promise of even greater transparency and engagement." (p. 169). Please see our comments at the beginning of the section on Principle 3 to understand the problems with the PSEIS.

consideration of conservation interests occurred with the “RPA Committee” where the industry dominated the process to roll back Steller sea lion protection measures that had existed at the time.

The team should score this PI downward because there are serious problems at the 80 SG level. As demonstrated by the team’s analysis, the management fails to meet two of the three requirements at the 80 SG level:

- The management system provides for involvement by all significant public and private stakeholders and consideration of their interests
- The management system does not show any distinct evidence of a pattern of discrimination against significant stakeholder interests

As such, the team must require a condition to address this deficiency.

PI 3.3: The management system assesses relevant information pursuant to objective, fair, equitable processes. [Relates to MSC Criterion 3.2]

The report finds that the Council solicits recommendations for GOA groundfish FMP amendments on an annual basis, encouraging stakeholder participation in the process. (p. 171). The team asserts that “the management system for these fisheries, defined in the broadest sense, has come to enfranchise the interests of all major stakeholders and is making meaningful progress toward understanding the full range of impacts from the fisheries.” (p. 171). Significantly, the report states that team would not assign the score it did to this PI if it “were it to define the management system to include only the administrative or regulatory process overseen by NMFS and the Council. But having included the federal judicial and legislative branches within the definition of the management system, it is clear that all stakeholders ultimately have access to a mechanism to place relevant information before appropriately impartial decision-makers.” (p. 172).

We strongly disagree with the definition of the management system including the judicial and legislative branches. Please see our detailed comments on this issue at the beginning of the Principle 3 section. We urge the team to consider the management system to include only NMFS and the Council. Under that definition, this PI must be scored downward.

Further, the analysis under this PI contradicts statements in the discussion under the PI 3.2. For example, the information presented under PI 3.2 states clearly that the management system has failed to enfranchise conservation stakeholders.

PI 3.4: The management system provides for timely and fair resolution of disagreements [Relates to MSC Criteria 3.2, 3.5]

The report finds that

> the management system regularly addresses and resolves disagreements involving a wide range of parties and issues. The strength of the dispute resolution system is greatest at the higher levels of the process, but weaker at lower levels, where certain disagreements seem to be chronic. In assigning this score, the team recognizes that the current process does not give rise to confidence that some important issues will regularly be resolved in a fair or timely way at the agency or council levels. Too many disputes have festered for too long at those stages of the management system, leaving the courts and federal legislature to tackle issues that could have been resolved in the region. Here, too, the management system would benefit from an independent retrospective analysis of the manner in which certain disputes arose in and were addressed by the management system in order to determine whether the substance or procedure followed could have been improved. (p. 173).

Despite recognizing that the current process does not inspire confidence that important issues will be resolved in a fair or timely way at the agency or Council levels, the team scores this PI above 80. It appears that if the team had viewed the management system as only consisting of NMFS or the Council, it may have scored this PI lower. Again, we note our disagreement with the definition of the management system and urge the team to revise the definition much more narrowly.

We disagree that the management system provides for timely and fair resolution of disagreements. For example, NMFS has demonstrated an unwillingness or inability to resolve disagreements by its failure to produce legally compliant NEPA analyses on the groundfish fisheries, including evaluation of the cumulative impacts of fisheries management actions on benthic invertebrates, groundfish, marine mammals, seabirds, or fishing communities. The situation with protecting Steller sea lions is another example of Council and agency inaction and avoidance of taking measures that would be unfavorable to industry. At virtually every juncture, management has avoided taking steps, unless forced by court order, to lower TAC levels and spread out the fishery in space and time to protect sea lions. In addition, the conservation organizations' proposal to set MSSTs from July 1999 has still not been addressed four years later despite receiving the highest rating and NMFS's recognition for the need to set MSSTs to comply with the law.

A more limited definition of the management system should result in the team scoring this PI at the 60 SG level because "Although dispute resolution mechanisms are in place, the management system fails to demonstrate meaningful progress toward resolution of outstanding disputes."

<u>PI 3.5</u>: The management system presents managers with clear, useful, relevant information, including advice [Relates to MSC Criterion 3.2]

The report finds that the management system receives a large and generally reliable and useful body of information and advice, particularly with respect to stock assessment, some socioeconomic matters, and ecosystems. (p. 175). The report notes that the team would have assigned a higher score to this PI but for the management system's present lack of compliance with NEPA, as determined by the federal courts. (p. 175).

The report notes that the team

> did not receive information from any source indicating that the management system, particularly at the NPFMC level, receives and considers a meaningful range of carefully evaluated alternatives for action. It is clear that the Council considers different TAC levels, but less evident that evaluated alternatives are presented on other matters. In this respect, the team was concerned by evidence suggesting that the Council makes decisions to act in specific ways that have not previously been evaluated by federal agency officials in terms of legal or policy constraints, requiring the agency to craft after-the-fact analyses that attempt to validate Council action, rather than inform it. (p. 175).

To address the deficiencies in this PI, the team requires the fishery to meet the Condition required under Principle 3, PI 2.2. Please see our comments on the analysis and condition for PI 2.2 regarding how the agency fails to respect and comply with domestic law.

The team should score this PI downward because the management fails to comply with the 60 SG level requirements:

- The management system's decision makers repeatedly base decisions on information or factors not developed or presented through the "official" or routine process
- The management system's decision makers repeatedly act in a manner contrary to the advice developed or presented through the "official" or routine process
- The management system's decision makers appear frequently to be unaware of the consequences of or risks inherent in their decisions

As the agency has failed to complete the programmatic analysis of the groundfish fisheries' impacts on the environment pursuant to NEPA and as discussed above the current draft PSEIS is fundamentally flawed, the management is unable to demonstrate that it meets the 60 SG requirements. Until a legally sufficient PSEIS is complete, the management is unable to base decisions on complete information or be aware of the consequences of or risks inherent in their decisions because it does not have adequate comprehensive information upon which to act. In addition, the management fails to incorporate the valuable information provided in the Ecosystem Considerations chapter of the SAFE report into the TAC setting process.

PI 4.1.1: Catch levels are set to maintain high productivity of the target population and the ecosystem [Relates to MSC Criterion 3.10]

The report states that the Council and NMFS do not set catch levels explicitly to maintain high productivity of the ecosystem, per se because the ABC and TAC setting process "do not quantitatively incorporate the needs of predators or other ecosystem-level considerations into conventional single-species catch levels." (p. 177).

The team scores this PI apparently below the 80 SG level because the GOA pollock stock "is in persistent decline, with some spawning aggregations reduced by 90 percent from recent levels. There is no empirical evidence that harvest levels are set to recover spawning populations, especially if the impact of environmental influences is properly incorporated." (p. 178). Further, the report states:

The evaluation team recognizes that uncontrollable environmental factors influence the abundance of pollock stocks in the North Pacific. It may well be that harvest levels in the Gulf of Alaska are having little or no impact on the long term abundance of that stock (see Indicator 1.1.2.1 under Principle 1), suggesting that the Gulf fishery ought to achieve a higher score. However, in the face of significant environmental influences that may well be the determinative factor in current GOA Pollock abundance, it is still of significant concern to the evaluation team that the harvest strategy utilized has not been robustly tested against a variety of possible scenarios including declining biomass as a result of environmental variability. The evaluation team believes there should be a substantive body of work showing what TAC levels can and should be utilized in the GOA Pollock fishery at low levels of abundance.

To address these issues, the team requires the following condition:

To retain certification, the fishery must implement the harvest level and biomass level related conditions associated with Indicators 1.1.1.5 and 1.1.2.1 under Principle 1 and Indicator 1.1 under Principle 2.

Please see our comments under Principle 1 PI 1.1.1.4 and PI 1.1.2.1 and Principle 2 PI 1.1.

In addition, the Council recently increased the GOA pollock quota 31% from last year despite the fact that at 28% of unfished abundance and below the MSY level. Even if it is true that the low stock size is attributed to environmental variability and not fishery exploitation, the stock is below the MSY level regardless of the cause. Thus it is imprudent according to the single species MSY-based theory under which pollock is managed to increase the exploitation level by almost a third.[578]

Significantly, the report ignores the fact that there is no clear policy framework or procedure within the conventional single-species assessment procedures for incorporating non-quantitative information on impacts to food webs, protected species, habitats, etc. The FMPs define overfishing levels and sustainability with respect to the Magnuson-Stevens Act standard of maximum sustainable yield (MSY), a simplified production theory which regards any fish production above the level required (in theory) to maintain spawning stock at a given target size as "surplus" for the fishery. (PSEIS, ES-66). To compensate for the ecological deficiencies of MSY, overfishing guidelines must be modified to account explicitly for the roles of target species as prey for other fish, marine mammals and birds, as well as the unique life history characteristics, habitat needs and scientific uncertainties that make target species vulnerable to conventional MSY levels of fishing mortality.

Fishing levels should be set in a highly precautionary manner to preserve ecological relationships between harvested, dependent and related species. The TAC-setting process should contain procedures and requirements to reduce maximum allowable levels of fishing under the conventional "single-species" MSY rules to an Optimum Yield (OY) level that addresses both the cumulative effects of fishery-maximizing exploitation strategies that are designed to out-compete the other parts of the ecosystem, and local-scale impacts of spatial/temporal concentration of fishery catches. Fishing for important prey species such as pollock should be reduced to more precautionary levels to maintain the forage base for predators at high levels of abundance relative to the unfished condition as is done under the CCAMLR, which sets the harvest policy for important forage species such as krill (*Euphausia superba*) at $F_{75\%}$ in an effort to take the needs of predators into account.

Uncertainty factors should be incorporated systematically into ABC/TAC-setting to account for measurement errors (surveys, fishery observer data), process errors (stock assessment model simulations), and extrinsic ecological and environmental factors that act on fish population dynamics in unknown and/or unpredictable ways. The overall approach reflects a policy objective to maintain a large margin of safety in recommending acceptable biological catches in an environment where uncertainty is all-pervasive and even the best available scientific information is frequently full of unknowns.

Specifically, the report's analysis fails to address that the fishing rates and catch levels that are deemed "conservative" relative to the conventional MSY yardstick may have considerable peripheral impacts on food webs and habitats that are not reflected in a simple comparison of catch to the estimated "biomass" of a target stock in the status quo TAC-setting process. In addition, the team should require the following management changes to account for ecosystem needs:

For important prey species in Tiers 1-3 such as EBS pollock, the target fishing rate should be set at $F_{75\%}$ as an ecosystem proxy and set MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics). In addition, explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species and habitats are necessary. For stocks managed in Tiers 4-6 such as Aleutian Islands pollock, there is not adequate information to estimate biological reference points (BRPs) and minimum stock size threshold (MSST) so there should be no directed fishery TAC specified until data available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Stocks in Tiers 4-6 should be designated to bycatch-only status.

[578] This statement should not be construed as endorsing the current single species MSY management approach. As the conservation community continually advocates, ecosystem based management is necessary to protect the species and habitat within the North Pacific fishery management areas.

In sum, the team must revise the score downward to account for the lack of consideration in setting catch levels for ecosystem concerns. The management fails to meet the second requirement for the 60 SG level because "[c]atch levels are not appropriately adjusted in a timely manner to respond to information indicating that harvest is having unacceptable adverse impacts on target species or the ecosystem."

PI 4.1.2: Restricts gear and practices to avoid catch of non-target species, minimize mortality of this catch, and reduce unproductive use of non-target species that cannot be released alive [Relates to MSC Criterion 3.12]

The report states that the "Council has spent a great deal of time and effort working to reduce bycatch in the groundfish fisheries off Alaska" by instituting PSC caps, requiring retention of all pollock and cod, publishing the names of vessels and their discard rates on a weekly basis, putting bycatch data on the Internet. (p. 179).

The report notes the program allowing the donation of salmon and halibut taken as bycatch to economically disadvantaged individuals through a NMFS authorized distributor. (p. 180).

The report finds that the management system has done an excellent job of reducing catch of non-target species and making productive use of those that are caught. (p. 180).

This PI fails to discuss the difference between the gears used by the GOA pollock fleet that include both bottom and pelagic trawl gear. Please see our comments under Principle 1, PIs 1.2.1 - 1.2.3 for concerns about bycatch management. They regard:

- limitations of bycatch caps as a management tool to reduce bycatch;
- problems of the North Pacific Observer Program in bycatch monitoring;
- limitations of existing gear closure areas as a management tool to reduce bycatch;
- North Pacific fishery bycatch regulations are not adequate as designed to address the environmental impacts of incidental catch in the pollock fisheries;
- salmon bycatch in the pollock fisheries; and
- "other species" bycatch in the pollock fisheries.

PI 4.1.3: Accounts for catch of non-target species [Relates to MSC Criteria 3.10, 3.17]

The report notes that the observer program requires 100% observer coverage on all vessels over 125 feet in length and 30 percent coverage on vessels 60 to 125 feet in length and that observers are stationed at onshore processing plants. (p. 181). The report states that

In the view of the evaluation team, the Gulf of Alaska fishery barely received a passing score because the monitoring system there, while strong in some important ways, presents at least two weaknesses. The Gulf fleet is subject to no more than 30 percent observer coverage, with no coverage on smaller boats, and the observer program is subject to procedures that may bias observer data. (p. 181).

The report fails to note that bycatch limits do not account for the uncounted crustaceans, mollusks, and other benthic life that are crushed or maimed by trawl gear and left on the seabed, or for the majority of non-targeted species caught. Therefore, they understate the full impacts of fisheries; and they provide no protection to seabed habitat from trawl gear disturbance and damage.

To address the concerns with the smaller boats and less observer coverage, the management should require 100% observer coverage on vessels greater than 60 feet and 30% observer coverage on vessels less than 60 feet. Please see our comments under Principle 1, PIs 1.2.1 – 1.2.3 for our detailed concerns about bycatch of non-target species.

This PI should be scored downward to the 60 SG level because information on catch of non-target species is imprecise and inaccurate, especially for the unobserved boats.

PI 4.1.4: Minimizes adverse impacts on habitat [Relates to MSC Criteria 3.10, 3.13]
The team interprets the term "habitat" in this PI to refer only to pollock habitat, not all aspects of habitat throughout the ecosystem. (p. 183). The team finds that the management system has taken steps to minimize habitat impacts from the fishery by requiring full retention of pollock and cod, using economic incentives to accomplish habitat and stock conservation goals, closures around Kodiak Island to preserve crab and their habitat and reduced bottom trawling. (p. 182).

The report recognizes the agency's noncompliance in designating EFH as required by the Magnuson-Stevens Act and NEPA. (p. 183). However, the team expects that the current processes to designate EFH will result a considerable body of new information and analysis that will enable the management system to take additional steps to benefit pollock habitat.

The team would have scored the fishery higher but for the continued use of bottom trawling in that fishery and the comparatively limited use of closed areas. (p. 183).

First, we disagree with the team's interpretation of the term "habitat" to include only pollock habitat. This PI should address all habitat, including that used by pollock predators and that impacted by pollock fishing. The team's definition unfairly limits the scope of this PI without good reason. Further, the analysis contains no discussion about disruption of prey fields as a habitat impact. Significantly, in the 2001 FMP BiOp, NMFS found that the pollock fisheries adversely impact Steller sea lion critical habitat. If all habitat were included, the team should score this PI downward.

Also, the teams' scoring of this PI above the 80 SG level fails to give adequate weight to the fact that there are no explicit habitat protection measures for exploited groundfish stocks, including pelagic habitat for pollock. Existing trawl closure areas afford no habitat protection in the deeper waters of the continental shelf and slope of the west-central GOA, where much of the effort of the pollock fleet is concentrated. Further, existing trawl closure areas are not designed to protect EFH, such as the heavily exploited spawning grounds of pollock, because there are no explicit habitat protection measures for exploited groundfish stocks at any life history stage. The Council and NMFS have not acted in a proactive, precautionary manner to protect spawning habitats in those areas where the pollock fishery continues to operate. The team should require that the management designate spawning area closures to protect essential reproductive habitats of pollock. In addition, the team should require the management to prohibit trawling in all designated critical foraging habitat of the endangered Steller sea lion population.

The report fails to address the impacts to harbor seal or Steller sea lion habitat from the GOA pollock fishery, including disruption of prey fields. The report fails to discuss specifically the impacts from bottom trawling. Please see our comments under PI 1.2.1 regarding benthic impacts by bottom trawling in the GOA.

This PI should be scored downward.

PI 4.1.5: Does not use destructive fishery practices *[Relates to MSC Criterion 3.14]*

The report concludes because "the GOA pollock fishery does not use destructive fishery practices in their harvest of pollock and there is good information to prove it." (p. 184). The report fails, however, to support this statement or provide any information to prove that destructive fishing practices do not occur with the pollock fishery. Without support, this statement is conclusory and the score for this PI must be moved downward.

There is no discussion about the impacts of the gear used by the GOA pollock fishery. This fishery is prosecuted by bottom trawl and so-called pelagic trawl gear. Bottom trawl gear has significant impacts on benthic habitat and species. Please see our comments under PI 1.2.1. Also, although so-called "pelagic" trawl gear is supposed to fish in the water column, it is destructive to habitat. Pelagic trawl gear by design touches bottom a significant amount of the time, up to 85 percent of the time by some estimates. In addition, the report fails to discuss the impact to invertebrates that are crushed or maimed by trawl gear that contacts the bottom.

<u>PI 4.1.6</u>: Provides for rebuilding and recovery, where applicable *[Relates to MSC Criterion 3.10]*
The report states that although the control rules reduce exploitation rates for tiers 1 to 3 at low stock size, "there is little demonstrated empirical evidence or simulation results to suggest whether this is adequate to promote rapid recovery." (p. 185). The report also notes correctly that there is "evidence that exploitation rates increased as stocks declined in both the GOA and the Aleutian Islands." (p. 185).

The team scored the GOA pollock fishery below 80 "because of the continued downward trend for Gulf of Alaska pollock spawning stock and biomass." (p. 185). The report notes that although the model described in the recent SAFE reports shows that GOA stocks "should rebound if fishing pressure is reduced, the results suggests that the model may not be accurate." (p. 185). To address this issue, the team requires the "fishery must meet the same conditions that are required under indicator 1.1.1.5 for Principle 1. No additional work would be required at this time."

As discussed under Principle 1, the GOA pollock fishery should be declared overfished because it is below MSY and the stock has declined significantly over the last 30 years. As such the Magnuson-Stevens Act requires a rebuilding plan. Instead of focusing on rebuilding this stock, the Council has increased the harvest level for the upcoming fishing year. This directly ignores the SAFE report statement quoted above that suggests the stock should increase if fishing pressure is reduced.

In addition, the report fails to address whether overfishing of this stock is occurring in the ecosystem sense.

The condition required for this PI does not address the lack of measures taken to rebuild the stock and instead should require actions in the water which will improve the current situation. For example, more can be done for the depleted GOA population like the establishment of spawning area closures and significantly lowering the TAC level, if fishing is allowed at all on this overfished stock.

<u>PI 4.1.7:</u> Applies closures or restrictions when catch limits reached
The report states that "NMFS consistently issues notices to close the pollock fishery in order to stay within the designated TAC level" but also notes summarily the "recent history of exceedences in the fishery." (p. 186).

The report does not elaborate on the exceedences and should specify when they have occurred. In the late 1990s, at least four times the GOA fishery exceeded the TAC. Moreover, because approximately one-third of the vessels do not carry observers, it is difficult to say with certainty when catch limits are reached. Thus, history shows the inability of in season managers to be precise and as such, there is always the risk the fishery will exceed the TAC level.

PI 4.1.8: Incorporates no-take zones, and MPAs, or other mechanisms, where appropriate to achieve harvest limits and ecosystem protection objectives [Relates to MSC Criterion 3.10]

The report points to "numerous closed areas in effect for the GOA trawl and other fisheries, which include closures affecting the pollock fishery." (p. 187). The report notes closures pertaining to Steller sea lion critical habitat and also other "restricted areas in the GOA include the pinnacles closed area near Sitka and the Shelikof Straits conservation area between Kodiak Island and the Alaska Peninsula where pollock fishing is restricted in known spawning areas." (p. 187). The report states "the use of closed areas either to specific gear types or in general, has been in use in the GOA for many years. Closed areas for trawling around Kodiak Island have been discussed elsewhere in this document. Ecosystem protection is also accomplished by setting temporally spaced fishing seasons to restrict bycatch (see Amendment 24) and by restricting the take of target, bycatch, and prohibited species." (p. 187).

The report notes that the "team was presented with no evidence to suggest that the management system has yet evaluated the benefits of the closures." (p. 187). To address the problems with this PI, the team requires the fishery to meet the conditions described under Principle 2, Indicator 1.2.1. This condition, which requires compliance with the requirements of Principle 2, PI 1.2.1, does not address the problem that the management system has failed to incorporate mechanisms to achieve harvest limits and ecosystem protections.[579]

NMFS has admitted that there are no explicit habitat protection measures for exploited groundfish stocks at any life history stage in the groundfish FMPs.[580] The management should protect at least 20% of known spawning grounds of target species. That includes pollock spawning grounds along Shelikof Strait, Shumagin Islands and offshore. HAPCs should be designated and attendant protections for submarine canyons and gulleys such as Shelikof Strait, Barnabus and Chiniak Gulleys. Addressing trawl impacts on productive spawning grounds will provide important protection to both species and address shortcomings in both the groundfish and crab FMPs.

Given the discrete spatial and temporal aspects of spawning grounds, the critical ecological function of spawning grounds to reproduction, and the vulnerability of species such as pollock, to fishing gears at this spawning period, these areas are logical places to focus management actions to protect habitat. The steep declines of spawning stocks of pollock in the Shelikof Strait, in the Bogoslof/Aleutian Basin, and Aleutian Islands are further reason to protect pollock spawning grounds and to devise protective measures for these habitats, particularly for pollock spawning grounds in areas where intensive fishing still continues on spawning aggregations. These areas would make excellent pollock HAPCs because they are located in upwelling zones of high productivity over fixed bathymetric features, thus they meet the criteria for ecological function, exposure, sensitivity and rarity.

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[579] The condition for Principle 2, PI 1.2.1 states:

To improve the deficiencies in performance for this indicator, the fishery must improve assessments of impacts on habitats as follows:

- Provide a thorough written review of the state of knowledge of the impact of pollock fishing on SSLCH and on the relevance of the SSLCH concept, in order to focus future research onto key unknown questions. These will probably include the question of defining critical habitat for foraging Steller sea lions as opposed to critical habitat where disturbance to resting or breeding animals should be constrained.
- Provide a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds.
- Develop and implement research programs to provide the missing information identified in 1-3 above required to identify whether the fishery has adverse effects on habitats through gear loss or through enhancing local food supply to scavenging seabirds.

[580] NMFS 2001 North Pacific Draft PSEIS 4.1, p. 53.

In addition, areas identified for squid bycatch management in the 2001 draft PSEIS Alternative 4 (2001 draft PSEIS, Fig. 4.1-19) would make ideal closure areas because they are located in upwelling zones of high productivity over fixed bathymetric features where zooplankton, squid, forage fish, groundfish, mammals and birds all congregate to exploit predictable concentrations of their prey, such as euphausiids, as NMFS noted in 2001.[581] As such these areas would achieve multiple goals for habitat conservation and management under the FMPs, providing protection for target species (pollock, cod, Greenland turbot), non-target bycatch species (squid, forage fish), and listed species (northern fur seal, Steller sea lion, fin and sperm whales, and the short-tailed albatross).

The team should require the creation of such closure areas.

In addition, the team should require other mechanisms to achieve harvest limits and ecosystem protection objectives as required by this PI. This includes for stocks managed in Tiers 1-3, setting the target fishing rate at $F_{75\%}$ as an ecosystem proxy and setting MSST spawning biomass at $B_{40\%}$ (or higher, depending on life history characteristics) for important target prey species such as pollock. In addition, there must be explicit spatial and temporal management of TACs to prevent localized depletion, serial overfishing by area, adverse local or regional impacts to species and habitats. For stocks managed in Tiers 4-6 for which there is not adequate information to estimate biological reference points (BRPs) and minimum stock size threshold (MSST), there should be no directed fishery TAC specified until data is available to estimate biomass and values for $F_{X\%}$, $B_{X\%}$, F_{OFL}, MSST. Stocks managed Tiers 4-6 should be designated as bycatch-only status and require full retention and utilization of bycatch species in Tiers 4-6 as a data collection method.

PI 4.1.9: Minimizes operational waste *[Relates to MSC Criterion 3.15]*
The report notes that federal and state regulations govern discharge of seafood processing waste and effluent into the water. (p. 188). In addition, the report states that virtually all of the shoreside processing plants have dedicated meal plants to treat processing waste. (p. 189). The report points to the 1998 Improved Retention/Improved Utilization (IR/IU) regulations as reducing operational waste because all fishing vessels and processors must retain and process all pollock caught as bycatch and process that fish into a product. (p. 189).

The report fails to note that boats without comprehensive observer coverage or any observers cannot be accurately monitored to determine their compliance with IR/IU. Moreover, there is no report from NMFS showing the IR/IU program has effectively reduced bycatch, as opposed to discards. In addition, the team makes no mention of dead zones around seafood processing plants. Also, there is no discussion about the differing amounts of waste that occur with the different trawl gear types used in the GOA pollock fishery.

PI 4.2: The management system provides for compliance *[Relates to MSC Criteria 3.11, 3.16]*
The report states that the pollock fisheries are subject to multiple layers of monitoring, control and compliance assurance mechanisms, by the U.S. Coast Guard, NMFS enforcement division, the Council, the federal observer program, fishery cooperatives and the Magnuson-Stevens Act civil and criminal penalties provisions for violating fisheries laws and regulations. (p. 190).

The report fails to note that there are no observers on boats under 60 feet. At best there is an observer 30 percent of the time on vessels from 60 feet to 125 feet. Regarding coverage of vessels in the 30% coverage category, and independent report by MRAG Americas found that observer coverage is not random at the vessel level that has the potential to introduce unknown bias into the dataset. The review cited a high likelihood of differences in vessel

[581] NMFS 2001 North Pacific Groundfish Draft PSEIS 3.3, p. 53.

behavior between observed and non-observed vessel days, both in terms of fishing patterns and compliance with management measures. The report also found that the 30% coverage level may not provide enough spatial and/or temporal coverage for special scientific programs (e.g., otoliths, stomach contents sampling for ecosystem studies).

The MRAG report recommended the development of a mechanism under which the NMFS has direct control over coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage. To date, this recommendation has not been implemented.

For this PI, the report should discuss the problems with monitoring and compliance at these different observer levels. There should be 100% observer coverage required on all vessels greater than 60 feet and 30% coverage on vessels less than 60 feet. In addition, there is no discussion that the GOA pollock vessels do not carry Vessel Monitoring System (VMS) units that could increase the monitoring and compliance of the GOA pollock fishery.

PI 4.3: The management system provides for monitoring *[Relates to MSC Criterion 3.10, 3.11, 3.17]*
The report notes that the GOA "pollock fishery is carefully monitored through a comprehensive federal fishery observer program as well as extensive record keeping and log book reporting." (p. 191). The report notes the observer program's problems regarding coverage and the hiring process and cites to the independent review carried out in 1999-2000 by MRAG. (p. 192). Regarding coverage of vessels in the 30% coverage category, the MRAG report found that observer coverage is not random at the vessel level which has the potential to introduce unknown bias into the dataset. The review cited a high likelihood of differences in vessel behavior between observed and non-observed vessel days, both in terms of fishing patterns and compliance with management measures. The report also found that the 30% coverage level may not provide enough spatial and/or temporal coverage for special scientific programs (e.g., otoliths, stomach contents sampling for ecosystem studies).

The MRAG report recommended the development of a mechanism under which the NMFS has direct control over coverage levels, timing, and placement of observers, to ensure that bias is not introduced through non-random selection of vessels and periods for observer coverage. To date, this recommendation has not been implemented.

The report states "The score for the Gulf of Alaska reflects the lower level of monitoring by observers in fishery. The team noted with some concern that, while the management system had commissioned independent reviews of the monitoring program, the major recommendations from those reviews were yet to be enacted." (p. 192).

Despite the teams' serious concerns at the 30% coverage level, there is no condition attached to this PI. Further, there is no analysis at all about the lack of coverage entirely for vessels less than 60 feet long. There should be 100% observer coverage required on all vessels greater than 60 feet and 30% coverage on vessels less than 60 feet.

The team should require the MRAG review recommendations to be adopted.

PI 5.1: The management system provides for internal assessment and review *[Relates to MSC Criterion 3.3]*
The report states that the fishery management system "undertakes significant internal reviews of certain key technical and scientific issues, resulting in useful improvements to the system over time." (p. 194). It notes, however, that external pressures associated with meeting fishery participants needs drive most of the changes the Council proposes, rather than information derived from routine internal assessments conducted to determine whether the fishery is meeting its stated goals and objectives. (p. 194). The team states if would have scored this PI higher except they received no evidence that the management system had conducted an appropriate internal evaluation of the management problems that have arisen, and in many respects defined, the management process

over the past several years. The team questions whether NMFS is capable of recognizing and understanding the consequences of the federal action it is undertaking and learning from the past in order to avoid repeating mistakes unnecessarily and to adapt management programs pursuant to a consistent and coherent policy framework. (p. 194).

To address the problems with this PI, the team requires the fishery to

demonstrate the existence of a periodic, candid and authoritative internal review process for pollock fishery management procedures and outcomes and publish the results of such a review process. The managers may wish to consult with the U.S. Institute for Environmental Conflict Resolution or other entities with expertise in dispute resolution in the context of natural resource management. (p. 194).

NMFS and the Council do not provide for adequate internal assessment and review and, as a result, fail to employ adaptive management in the groundfish fisheries. To learn from past management actions and adapt management programs accordingly, NMFS should have been taking a hard look at the direct, indirect and cumulative effects of management decisions as represented in the many amendments to the current FMPs on a regular scheduled basis. NMFS has failed to address the following questions in whole or part that are necessary to make the most informed proactive management choices:

1. How do the current FMPs enable NMFS to address the combined and cumulative impacts of management actions as reflected in the many amendments to the FMPs since the first EISs were prepared?

2. How effective have the successive FMP amendments been at addressing identified problems? What unintended consequences have issued from major regulatory initiatives, and how successfully have subsequent amendments mitigated them? Why were some measures more effective than others?

3. To what extent do the amendments to the FMPs reflect a precautionary approach? To what extent are they reactions to multiple crises rather than means of avoiding them?

4. To what extent are management decisions truly science-based versus allocative or political? In other words, what role does political influence play in the shaping of policy and management decisions, as expressed in the FMPs?

5. How has the ad hoc or piecemeal (incremental) approach represented in the many amendments and amendments to amendments to the FMPs resulted in a coherent policy framework for achieving ecosystem-based management or any other management goal?

The team should have scored this PI at the 60 SG level as the "management system does not have a regular program to evaluate management performance." The condition required by the team should expressly include that the five questions above be answered and that the management system conduct annual internal reviews. This condition should be required to start immediately with an internal review completed within three months.

PI 5.2: The management system provides for external assessment and review [Relates to MSC Criterion 3.2, 3.3]

The report finds extensive evidence of creditable, incisive external review of the management system's performance, especially regarding scientific matters and monitoring practices. (p. 195). This includes National Research Council of the National Academy of Sciences reviews, Council commissioned independent reviews, General Accounting Office reviews, oversight and legislative hearings by Congressional committees, the reauthorization and amendment of the Magnuson-Stevens Act, and evaluations by the federal courts.

The report fails to note that there have been no external reviews of the management system's performance as a whole.

PI 5.3: The management system includes guidelines for responding to assessment outcomes *[Relates to MSC Criteria 3.3, 3.7]*
The report finds that the management system has no objective guidelines for responding to internal or external evaluations. (p. 196). In addition, the team notes that the management system shows very little evidence of responding to the more searching evaluations it reviewed. (p. 197). The report refers to numerous examples: the agency has been sued repeatedly on essentially the same issues, and the system has not responded to the MRAG review of the observer program. (p. 197). In addition, the team states that management system shows some evidence of what might be called "peer shopping," where a review that reaches conclusions disfavored by certain stakeholders is set aside and other reviews commissioned until more welcome results are reported. (p. 197). This pattern appears quite evident in the series of studies and reports commissioned in the wake of the release of the November 2000 BiOp and in NPFMC's current consideration of retaining independent legal counsel, rather than relying on the NOAA General Counsel's office.

To address the problems with this PI, the team requires "the fishery must demonstrate the use of objective criteria in the system required under Indicator 5.1 - the internal evaluation of the pollock fishery management system's performance."

Please see our comments on PI 5.1. In addition, the team should score this PI at the 60 SG level because the "management system responds in an arbitrary fashion to assessments of management performance" as demonstrated by the team's analysis on this PI.

PI 5.4: The management system identifies research needs and directs appropriate funding and other resources *[Relates to MSC Criteria 3.3, 3.7]*
The report notes that research funding appears to be adequate at present, and allocated among a large number of important issues. (p. 198). However, the team notes with some concern that the funding is likely to return to historic average levels in a short period of time. (p. 198). The team notes that despite the annual reviews that identify research priorities and develop plans to spend available research funds, the management system has not developed a strategic long-term research plan as contemplated by this PI. (p. 198).

Despite the team's recognition that the management has not developed a strategic long-term research plan, it fails to require a condition for this PI. In addition, the report acknowledges that funding will contract shortly and notes specifically that the agency's budget request for 2004 regarding funding for Steller sea lion research is about half of the funding appropriated in FY 2001 and 2002. As this report noted in the Principle 2 section, there are huge open questions that remain regarding the cause of the decline of Steller sea lion and the impacts of fishing on the ecosystem. Sustained funding is necessary for research focused on understanding the decline of sea lions and other marine mammals and the effects of fishing on the ecosystem. As there is no guaranteed funding to address these important issues over the long term, the management does not meet the following requirement at the 80 SG level that "Funding is predictable over long-enough time scale to allow continuity of all major stock assessment and ecological interactions research programs.

APPENIX 7 – MSC OBJECTIONS PROCESS DOCUMENTATION

Dr. Chet Chaffee, Project Manager
Scientific Certification Systems, Inc.
Marine Fisheries Conservation Program
2000 Powell Street, Suite 1350
Emeryville, CA 94608

August 26, 204

SENT VIA EMAIL

Dear Chet,

Please accept this objection regarding the *MSC Assessment Report- the United States Gulf of Alaska Pollock Fishery* wherein the certification evaluation team made the final determination that this fishery should be certified according to the MSC Standard. We object to the "Final Determination" to certify and disagree with the analysis regarding the Performance Indicators (PIs). This objection discusses the errors made in the Final Determination which significantly affect the outcome of the determination.

As with our objection to Final Determination to certify the Bering Sea /Aleutian Islands pollock fisheries, we appreciate this opportunity to object to the Final Determination to certify the Gulf of Alaska pollock fishery and to use the MSC Objections Procedure. We again recognize the extra lengths to which you have gone to involve stakeholders that are beyond what has been the standard for previous MSC assessment processes. Stakeholder involvement and transparency should be required in every level of the process. While we very much disagree with the outcome of the assessment, we recognize the significant effort that the team put forth throughout the process to assimilate a large amount of information and in writing the final reports.

Best regards,

Stacey Marz
Consultant to Trustees for Alaska
308 G Street, Suite 219
Anchorage, AK 99501
(907) 929-9372
(907) 929-1562 (fax)
stacey-marz@gci.net

Cc: Alexia Cummings, MSC
Brendan May, MSC

OBJECTION to FINAL DETERMINATION TO CERTIFY THE GULF OF ALASKA POLLOCK FISHERY

Submitted on behalf of:

Alaska Oceans Program
Greenpeace International
National Environmental Trust

Stacey Marz, Esq.
Consultant to Trustees for Alaska
308 G Street, Suite 219
Anchorage, AK 99501
(907) 929-9372
(907) 929-1562 (fax)
stacey-marz@gci.net

We object to the Final Determination to certify the Gulf of Alaska (GOA) pollock fishery according to the MSC Standard. The team failed to adequately consider the information we submitted regarding why the GOA pollock fishery does not meet the MSC Principles and Criteria and associated Performance Indicators and on the Draft Determination to Certify the Gulf of Alaska pollock fishery. Over the last three and a half years, we have supplied the team with extensive information about the problems with the Alaska pollock fisheries and the management by the National Marine Fisheries Service and the North Pacific Fisheries Management Council. This included specific comments on why the GOA pollock fishery does not comply with the MSC Principles and Criteria and the Draft Determination. Despite these efforts, unfortunately we do not notice any significant changes in the analysis of the Performance Indicators (PIs) or the Conditions. Rather than repeat the numerous concerns and arguments that we have already communicated to the team, we incorporate by reference all information supplied to the team during the assessment process. The information we provided should have resulted in a determination that the pollock fisheries do not meet the MSC Standard. We urge the team to reconsider that information and the Final Determination.

We also incorporate the two reports written by Bridgespan and Wildhavens that identify numerous serious problems with the MSC and demonstrate that the MSC is in desperate need of reform. We agree with the reports' concerns and recommendations, including those that resulted from the January 2004 Arlie House meeting. We highlight the following concerns:

- the MSC should not certify fisheries that have not complied with the law;
- the MSC certification claim is misleading, if not fraudulent, that certification means the fishery is in fact sustainable and well-managed because fisheries are certified without having met the conditions required for certification; and
- there has been lack of rigorous application of the MSC Principles and Criteria, resulting in very problematic fisheries being certified.

Until the MSC has made the necessary changes to address these and the other identified problems, it is premature and environmentally irresponsible to move ahead to certify the world's largest white fish fishery.

From the information submitted previously, we highlight a few points of significance below which warrant the team to reconsider its decision to certify these fisheries.[582] These include:

- the failure to include scores and weights on PIs in the Draft Determination;
- the erroneous interpretation of what constitutes the "management system";
- the low stock size of GOA pollock;
- the high catch in Steller sea lion critical habitat;
- insufficient treatment of the litigation history and adverse legal opinions against the management system and fishery.

Scores and weights should have been included in the Draft Determination

[582] Our decision to not repeat most of the concerns and arguments raised below on each PI should not be interpreted as support for the treatment of those PIs in the Final Determination. The team should review all the points raised in our comments on the Draft Determination in reviewing this objection.

As we have stated in the past, the Draft Determination should have included the scoring and weighting attributed to the individual PIs. As we pointed out before, stakeholders would be able to provide more informative comments to the Draft if they understand how the certification team evaluated the various PIs. Inclusion of the scores and weights in the draft is essential to understanding how the fishery was evaluated and how to comment most responsively on the Draft Determination.

Now, because scores and weights were not included in the Draft Determination, it is impossible to discern if the comments we provided on the Draft had any impact on the outcome of the Final Determination. If the scores were adjusted based on comments, it is invisible because only the final score is available and there is no previous score for comparison. In addition, it does not appear that any of the conditions changed or any new conditions were added as a result of stakeholder input. Thus, it makes one wonder whether the significant effort given to provide extensive comments on the Draft Determination was worth the time and had any impact on the Final Determination. In the absence of changed analysis from stakeholder comments, providing scores on both the Draft and Final Determinations would provide the stakeholders with a way to measures whether their comments had an impact on the final outcome.

Erroneous interpretation of the "management system"

In the Final Determination for the GOA pollock fishery, the certification team's scope of review regarding what constitutes the "management system" under Principle 3 is unacceptably broad. The team considers the management system to be the National Marine Fisheries Service (NMFS), the North Pacific Fishery Management Council, the U.S. Congress, the federal courts, and industry co-operatives. Instead, the team should have considered only the actions of NMFS and the Council in its analysis of the management system, the two entities that are vested with responsibility to authorize and manage the activities of the groundfish fisheries. This error is significant because it applies to the entire analysis regarding Principle 3 and the associated criteria and performance indicators. It results in the team scoring the pollock fisheries higher than if the "management system" was more narrowly construed to be NMFS and the Council.

We submitted comments on two occasions during the assessment process, asserting that the scope of the "management system" was too broad and should be narrower. We initially commented on the scope of what should be considered the "management system" when we submitted comments in August 2002 entitled, "*Discussion of the Alaska Pollock Fisheries Under Principle 3 Performance Indicator.*" (p. 1). We stated the following, initially quoting the objectionable language written by the team regarding Principle 3, SCS Criterion 1:

> Under Principle 3, SCS Criterion 1 states, "The management system has a clearly defined scope capable of achieving MSC Principles and Criteria and includes short and long-term objectives, including objectives for managing ecological impacts of fishing, consistent with a well managed fishery." This criterion explains that "As used throughout, the term "management system" is used broadly to include both governmental and private sector components. Governmental components include all applicable governmental systems, not merely the direct regulatory function of a single agency or statute. The judicial system is intended to be considered part of the 'management system.' Private sector components include the fishing industry itself."
>
> The judicial system should not be considered part of the management system. In the case of federal fisheries reform, seeking a remedy in court is a last resort, after failed attempts to get an agency to comply with the law through participation in regular and often lengthy Council and NMFS processes. Such processes are available to the public through notice and comment periods.

> Participation in court proceedings, however, is available exclusively to the parties involved in a specific lawsuit. Furthermore, resorting to litigation reflects that the Council and agency management of an issue has failed because there is no other recourse except to have a judge evaluate the situation and order the appropriate remedy. Thus, such management failure should not be considered part of the "management system."

Despite these comments, the Draft Determination regarding certification stated the following footnote 2 on page 117:

> As used in this report, the term "management system" is used broadly to include both governmental and private sector components. Governmental components include all applicable governmental systems, not merely the direct regulatory function of a single agency such as the National Marine Fisheries Service, which clearly has the dominant regulatory role, but often is not in full control of institutional forces affecting the fishery. The judicial system is intended to be considered part of the "management system", as is the federal legislative branch. Neither the courts nor Congress regulate the fishery in the traditional sense of the word, but from time-to-time it is undisputable that judges and legislators are deciding major issues for the fishery. Private sector components of the management system include the fishing industry itself and components thereof, such as catcher cooperatives. As both a matter of law and fact, responsibility for management of the pollock fishery lies in many hands throughout government and the private sector. The pollock management system is an intertwining of many subsystems, and it is the evaluation team's view that the system must be assessed as a whole.

In response, we submitted the following comments on the Draft Determination on page 60, telling the team that their interpretation of the "management system" was erroneously broad:

> We strongly disagree with this broad construction of the term "management system". The management system does not consist of all or even most of the "institutional forces affecting the fishery." Rather, the management system is that system created by federal law to manage the federal fisheries. In the case of a U.S. fishery, the management system under evaluation should be the National Marine Fisheries Service (NMFS) and, and the agency's handling of the advice given to it by the North Pacific Fishery Management Council (the Council). These bodies have direct regulatory control of the pollock fisheries and are the sole entities that manage them. In fact the Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act, makes it clear that the management is comprised of NMFS and the Council.
>
> The evaluation teams' defining the "management system" as "all applicable governmental systems" including the judicial system, the federal legislative branch, and private sector components such as catcher cooperatives is unacceptable. This is not an inquiry into whether a democratic system of government with three distinct branches works. It is an inquiry into whether the federal fisheries management regime, defined by statute and regulation, works. The courts and Congress get involved with the fisheries management system when it fails in some way. The judicial and legislative branches act as external correctives to the management system, not as an integral component.
>
> The judicial system is not a part of the fishery management system, and its participation in any aspect of fisheries management does not demonstrate that fisheries management works. Rather it demonstrates precisely the opposite. The judicial system has involvement with fisheries only when it has been demonstrated that fisheries management is illegal. That the federal courts can offer some redress for illegal fisheries management actions does not demonstrate that the fisheries

> management system works. To argue that it does is like arguing that the fact that one can sue a drunk driver for damages demonstrates that the traffic management system works. Courts redress wrongs. Courts correct illegal actions. Defining courts as part of the management system effectively assumes that illegal actions are par for the course. This is unacceptable.
>
> The legislative branch is also not part of the fishery management system, and generally intervenes when some party is unsatisfied with the performance of the fisheries management system. While Congress passes the laws that affect the pollock fisheries, nobody in the Senate or House of Representatives has any formal involvement in the day-to-day management of the fisheries. Although Alaska's Senator Ted Stevens is interested in the groundfish fisheries and has attempted to use his power as Chair of the Appropriations Committee by attaching fisheries related amendments to non-related pieces of appropriations legislation (known as riders), he does not manage the fishery.
>
> Finally, the private sector is clearly not part of the management system. Cooperatives are comprised of corporate and private business entities that are primarily interested in making money. They are motivated by generating maximum profits and see fish as a market commodity. This is in marked contrast to government agencies that are charged with being stewards of public federal resources for the benefit of all citizens.
>
> The broad interpretation of "management system" to include all branches of government and voluntary industry bodies has very significant consequences for this certification evaluation. It results in many of the PIs receiving higher scores than if the consideration of the management system was properly restricted to those legal entities charged with fisheries management – NMFS and the Council. If the scope of the management system was limited to the actual bodies that are involved in the daily management of the fisheries, the pollock fisheries would clearly fail under Principle 3 to meet the minimum score required for certification.
>
> We urge the evaluation team to revise the definition of the "management system" to include only NMFS and the Council. This change would require the team to re-evaluate all PIs under Principle 3 and revise its analysis and scoring. The outcome would certainly change and result in significant downward scoring.

Unfortunately, the Final Determination did not change to narrow the scope of what constitutes the "management system." The Final Determination states the following on page 130:

> It is important for the reader to understand that the assessment team's review of the "management system" has been heavily influenced by our threshold decision to adopt a broad definition of that term. As used in this report, the term "management system" is used broadly to include both governmental and private sector components (i.e., catcher-cooperatives). And governmental components include all applicable governmental systems (i.e., the federal courts and Congress), not merely the direct regulatory function of the National Marine Fisheries Service and North Pacific Fisheries Management Council.
>
> Our reasoning on how to conceptualize the pollock management system reflects the fact that, while NMFS and the Council clearly have dominant regulatory roles, they often are not in full control of institutional forces affecting the fishery. Neither the federal courts nor Congress regulate the fishery in the traditional sense of the word, but from time-to-time it is undisputable that judges and legislators are deciding major issues for the fishery. And they do so at the behest of stakeholders in the fishery, who seek leverage or support for their positions by opportunistically invoking the

authorities of all of the branches of the U.S. federal government.

The conservation community's comments on the draft assessment report included strong criticism of the team's use of a broad definition of the pollock management system. They argue that the proper definition would be limited to NMFS and the North Pacific Council, and that the result of including the courts in the definition is to bias upward many of the scores awarded to Principle 3 scoring indicators. (The conservation stakeholders are silent on the question whether inclusion of Congress in the definition results in a scoring premium or discount).

The assessment team agrees that many of the scores awarded under Principle 3 are probably higher, even quite a bit higher, than they would have been if we had limited our review of the "management system" to only NMFS and the Council. We cannot rule out the possibility, cited by the conservation groups in their comments on the draft report, that the fishery's passing score under Principle 3 rests predominately on the definition of "management system" we applied.

In asking the team to assess management of pollock by appraising NMFS and the Council in isolation from other influences, the conservation stakeholders would ask us to ignore the glaringly evident fact that the conservation stakeholders themselves regularly exert significant influence over management of the pollock fishery by invoking the authority of the courts, as well as by participating in the regulatory processes of NMFS and the Council.[583] Similarly, some of the most ambitious and progressive aspects of current fishery management exist because these conservation stakeholders and others successfully petitioned the Congress to amend federal fisheries law to require, for example, protection of essential fish habitat and adoption of ecosystem-based management.

It would have been unreasonable and arbitrary to assess the pollock management system solely in terms of the roles and performance of NMFS and the North Pacific Council. As a matter of both law and fact, responsibility for management of the pollock fishery lies in many hands throughout government and the private sector and all the principal stakeholders operate with full understanding of that fact. The pollock management system is an intertwining of many subsystems, and it is the

[583] In reference to footnote cited in the text above, the Final Report states the following:

The conservation stakeholders assert that "The judicial system has involvement with fisheries only when it has been demonstrated that fisheries management is illegal." This statement is misleading because it ignores the very profound influence that the mere threat of litigation has on the management system. The stakeholders also complain "That the federal courts can offer some redress for illegal fisheries management actions does not demonstrate that the fisheries management system works. To argue that it does is like arguing that the fact that one can sue a drunk driver for damages demonstrates that the traffic management system works." This analogy is misleading. The "drunk driver" is to the highway system as an individual fisherman is to the fishery. The more apt comparison between fishery management and highway management would focus on the conjunction of governmental authorities and private sector interests involved in siting a new highway or setting the rules for use of the road once built, including penalties for violations, such as drunk driving.

assessment team's view that the system must be assessed as a whole.[584] Considering the "management system" so broadly to include any entity that might affect the management of the fisheries is incorrect and extremely problematic. The consequences of this decision are serious and far-reaching because the interpretation of "management system" directly affects the scope of review of the entire Principle 3 and associated Criteria and Performance Indicators. The Final Determination acknowledges that the outcome of the evaluation would be different if the team considered the management system to be the entities directly involved in managing the fisheries – the National Marine Fisheries Service and the body that advises it, the North Pacific Fishery Management Council:

> The assessment team agrees that many of the scores awarded under Principle 3 are probably higher, even quite a bit higher, than they would have been if we had limited our review of the "management system" to only NMFS and the Council. We cannot rule out the possibility, cited by the conservation groups in their comments on the draft report, that the fishery's passing score under Principle 3 rests predominately on the definition of "management system" we applied.

Further, in footnote 56 on page 172, the Final Report states the following:

> It bears explaining that the assessment team's consideration of this indicator is particularly influenced by the team's threshold decision to consider the fishery management system to include, among other elements, the United States' federal courts, as well as the National Marine Fisheries Service. The team's analysis, thus, approached questions of "legal compliance" and "respect for law" from the perspective of the inter-related behavior of the various components of the system, especially the interaction of the courts and NMFS. Legal scholars, psychologists, and political scientists actively study how agency decision-making is affected by judicial review. The literature reveals strong disagreement on the question whether judicial review improves or impairs the quality of agency action, but there is no disagreement that agency rules, meaning in this case the way the pollock fishery is actually managed, ultimately manifest the energies and influences of the agency and the courts carrying into motion the statutory directives of the Congress. (Citations omitted).

In addition, under PI 3.3, the Final Report states in relevant part the following on page 191:

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[584] The Final Report states the following in reference to footnote 3 cited in the text above:

> We note that others have adopted an equivalent definition of the management system when trying to assess its performance. For example, a recent National Academy of Public Administration report on US fishery management says: "In a real sense, the fisheries management system is in disarray. Management is increasingly exercised by the courts through litigation, by Congress through its annual appropriations and reports, and by constituencies that seek redress through these forms. The regional councils and NMFS, which were assigned this mission by statute, are being driven to management-by-crisis due to a range of problems: litigation-related workload, court-ordered or sanctioned deadlines, process deficiencies, policy mandates, regulatory delays, inadequate resources, deficiencies in data, analyses, and science, and strained relationships between the system's managerial partners and their constituencies." National Academy of Public Administration, *Courts, Congress, and Constituencies: Managing Fisheries by Default*, p. xi (2002).

> The evaluation team would not assign the score it did to this Indicator were it to define the management system to include only the administrative or regulatory process overseen by NMFS and the Council. But having included the federal judicial and legislative branches within the definition of the management system, it is clear that all stakeholders ultimately have access to a mechanism to place relevant information before appropriately impartial decision-makers.

Please note that the team scored the fisheries an 80 on this PI and if they had defined the management system more narrowly, this PI would have scored lower and required a condition.

In sum, the certification team erred in considering any entity that deals with the pollock fishery in any way to be part of the management system. We reiterate all the comments we submitted on the Draft Determination regarding this issue. We urge the team revise its analysis and evaluate the management system, looking solely at the actions, procedures and policies of the bodies that directly manage the pollock fisheries – the National Marine Fisheries Service and the North Pacific Fishery Management Council. Such a revision will result in downward scoring of the PIs and overall lower score of the pollock fisheries, additional conditions and a failure of one or more MSC principles.

Low stock size

In discussing the status of the resource, the Final Determination soberly states the following in:

> In absolute terms, the GOA stock is currently at the lowest levels of spawning biomass since the early 1970s, and has been in nearly continuous decline since the mid 1980s. The stock is currently well below target reference points agreed in the FMP. This is of considerable concern, both from a stock management point of view, and also because of pollock's important role in the Gulf of Alaska food chain. (p. 39).

Despite recognizing the two-fold concerns about the low stock size both for the target stock and for pollock's place in the GOA food web, the team certified the fishery as "sustainable and well managed" under the MSC Standard. It should be clear from the excerpt above, however, that this fishery is neither sustainable nor well managed. The following section discusses our concern with the team's analysis regarding the low stock size on the target stock and the insufficient management actions to address the issue. The next section focuses on the impacts on the food web, including the incredibly high catch in endangered Steller sea lion habitat.

The team evaluated the stock size under PI 1.1.2.1 which states: "Current stock sizes are assessed to be above appropriate limit reference points."

100 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 90% probability.
- The reference biomass is above B_{MSY} and takes into account the needs of predators.

80 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 70% probability.
- The reference biomass is B_{MSY} or its equivalent and takes into account the natural variability of the stock.

60 Scoring Guidepost

- Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent.

The team scored this PI at 70 and provided the following explanatory text, starting on page 50 of the Final Determination[585]:

> This scoring indicator was the subject of considerable debate during the course of the SCS evaluation process. The main point of contention was the choice in the scoring guideposts of B_{MSY} as a limit reference point, since it is used more as a target reference point in the NPFMC tier system, with half B_{MSY} being regarded as the limit reference point in the US National Standard Guidelines (MSST – see discussion for indicator 1.1.1.1). It was also argued by some staff at AFSC, by other staff in NMFS (Dr Pamela Mace), and by Dr Rick Deriso of the IATTC, that B_{MSY} is in fact not an agreed limit reference point for the FAO or an internationally agreed limit reference point, as stated in the "intent" section of this scoring indicator. While it is agreed that this latter point is substantially correct, this does not in fact seem entirely consistent with the general agreement, including in the NPFMC harvest strategies, that F_{MSY} is a limit reference point for fishing mortality (it is hard to see how B_{MSY} can be a target if F_{MSY} is a limit). The SCS team also noted that there are references in the international literature to B_{MSY} as a limit reference point (e.g. Jennings et al., 2001).
>
> Notwithstanding the academic debate, the intent in choosing B_{MSY} as a limit reference point for Pollock was to ensure that a fishery for a species such as Pollock, which appears to be a key prey species in its ecosystem, should maintain the stocks at levels that would not jeopardize the productivity of key predator species (such as Steller sea lions). The issue of course is that there is no general agreement on what such levels should be (see detailed discussion of this issue in the preamble to the report on Principle 2).
>
> Another complication in scoring this indicator is that, especially for a naturally fluctuating population, B_{MSY} is not a fixed entity, nor indeed is $B_{100\%}$ (unfished population level) nor any fraction of this (such as $B_{X\%}$). It has already been noted, and is discussed in detail under Principle 2, that the Gulf of Alaska appears to be subject to decadal or longer time scale shifts in productivity ("regime shifts"), and that Pollock productivity and abundance is influenced by such changes. Stakeholders point to several concerns with regard to using B_{MSY}. Bernstein et al (2002) point to the importance of trying to distinguish and account for the relative impacts of fishing and environmental influences on abundance, and Marz and Stump (2002) point to the problem of the "shifting baseline" in calculating B_{MSY} in practice.
>
> For GOA Pollock, the issue of changes in productivity and non-stationarity in parameters such as B_{MSY}, needs to be addressed explicitly. Pollock recruitment is highly variable, and pollock dynamics, especially in the GOA, is driven by the frequency of strong year classes (see Dorn et al, 2002, Figure 21). Pollock recruitment was low in the 1960s, high in the late 1970s and early 1980s, and has been episodic but generally since then. As noted below, these changes in recruitment appear

[585] Please note that the text in the Final Determination regarding this PI is largely identical to the text in the Draft Determination, except the Final Determination also includes the seven paragraphs that precede the condition which respond to stakeholder and peer review comments on the Draft Determination.

to be unrelated to levels of spawning stock, and result in very large changes in stock size even in the absence of fishing. (Recent CIE reviews of the fishery by Godo (2003) and Haddon (2003) also emphasize this feature). As noted above, B_{MSY} is inherently an equilibrium concept, and as far as pollock is concerned, the GOA is not an equilibrium system. All this implies that evaluation of the fishery against this scoring indicator is not straightforward.

The 2002 assessment for the GOA stock (Dorn et al, 2002) shows the population to be at 28% of unfished spawning biomass, or at 24% if the risk averse assumption is made that the 1999 year class is of only average abundance (the assessment suggests it is stronger, but uncertainty in the estimate of year class strength is high as it is not fully recruited to the fishery as yet). Both these levels (28% and 24%) are well below the B_{MSY} proxy of $B_{35\%}$, which is based in turn on average recruitment levels over the period from 1979 to 1999. On this analysis, the GOA stock would fail this scoring indicator (score less than 60). (The corresponding levels for the 2003 assessment are 31% and 27% of unfished levels (Dorn et al, 2003), still below the reference level, though indicating a partial recovery in the stock levels).

Noting the scientific evidence for regime shifts in the GOA, and also that there does not appear to be any relationship between spawning stock levels and subsequent recruitment for this stock (Dorn et al, 2002), the SCS evaluation team requested some further analyses from Martin Dorn (AFSC, Seattle – leader of the assessment team for GOA pollock), using the existing base case assessment model, to calculate the following:

1. Projections for stock size (3+ biomass and female spawning biomass) in the absence of fishing. These would be based on the assumption that the same recruitments would have occurred in the absence of fishing as have occurred with fishing taking place. These provide an alternative baseline time series for “unfished biomass”.
2. A time series of relative depletion estimates for the GOA stock (biomass in a given year divided by unfished biomass in the same year, as calculated in 1 above).
3. A time series of exploitation rates for the GOA stock (catch divided by 3+ biomass).

Because of its importance to consideration of an appropriate evaluation against this scoring indicator, Martin Dorn’s response to this request is included as Appendix 3 to this report. In brief, and allowing for the assumption that unfished biomass can be calculated in the manner suggested, the key results are as follows:

1. Stock size for GOA pollock would have varied almost tenfold since 1960, even in the absence of fishing (Figure 1, Appendix 3).
2. The declining trend in abundance since the early 1980s (Dorn et al, 2002) is also evident for the unfished stock (Figure 1, Appendix 3).
3. The lowest relative depletion level in the time series is 59% of the corresponding unfished level for 3+ biomass, and 44% of the unfished level for female spawning biomass (Table 1 and Figure 4, Appendix 3). Both are well above the $B_{35\%}$ proxy for B_{MSY}.
4. Exploitation rates for GOA Pollock have generally been low, although there is an overall increasing trend to the time series (Figure 3, Appendix 3), and a tendency to higher exploitation rates at lower stock sizes.

It is also interesting to note that the exploitation rate for GOA Pollock has been less than the exploitation rate for EBS (Eastern Bering Sea) Pollock in most years, although the latter is generally regarded as being in a healthier state, being at much higher stock size relative to average unfished levels (Ianelli et al, 2002). (However the comparison needs to be viewed with caution. The assumption of no relationship between spawning stock size and subsequent year class strength does not appear to hold as well for the EBS stock as it does for the GOA stock). Nevertheless, the poor status of GOA Pollock seems to be due to a long period of generally poor recruitment, rather than to exploitation rates having been too high.

Before discussing the relevance of these results to this scoring indicator, it is worth discussing the key assumption that recruitment would have been the same for an unexploited stock. Of course this is an assumption that can never be tested. However for GOA Pollock, it seems as though it may be a not unreasonable assumption, given the lack of a clear relationship between spawning stock size and subsequent recruitment (Dorn et al, 2002). Martin Dorn discusses this point in Appendix 3:

“The depletion estimate obtained by taking the ratio of the model estimate of current biomass to virtual unfished biomass implicitly takes into account environmental trends that affect stock productivity. Both the conventional estimate of depletion and this new estimator do not take into account the indirect impacts of fishing due to changes in stock biomass (fewer recruits at low stock size, more cannibalism at high stock size). For example, the decline in mean recruitment in the 1980s and 1990s could be argued to be the result of lower spawning biomass, not environmental change. This line of argument is countered by noting that low stock sizes in the 1970s produced strong year classes, and that there isn’t a clear pattern of declining recruitment in a plot of recruitment against spawning biomass. Many fisheries debates revolve around the relative importance of fishing versus the environment. Perhaps a stronger case can be made for the environment in this instance because harvest rates for GOA pollock have been demonstrably conservative for a gadid (Fig. 3).”

Allowing that much of the decline in the GOA stock over the past 20 years is environmentally driven puts a different emphasis on the exploitation history and current status of this stock. The results in Appendix 3 suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level relative to where it would have been now if the stock had never been fished is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these levels are well above the proxy $B_{35\%}$ level for B_{MSY} if the latter is viewed as a potentially dynamic quantity. If environmental variability is ignored and B_{MSY} is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below B_{MSY}, and the stock is overfished based on the standard suggested for this scoring indicator.

Dorn et al (2003) have updated the analysis described in Appendix 3 to include consideration of the impacts of spawning stock size on recruitment, as well as the (unknown) environmental drivers. Depending on the form assumed for the stock recruitment relationship, the estimates of spawning stock depletion in 2002 range between 40% and 46% of unfished levels. They conclude that “These results suggest that environmental variability is the most likely explanation for current low levels of stock abundance”.

Which of these two views of stock status (relative to static or dynamic estimates of B_{MSY}) should the SCS evaluation team use to judge performance against this indicator? Neither is "correct" - they just represent different ways of viewing stock status. In considering this question, the evaluation team went back to their original rationale for choosing this indicator and selecting the reference level chosen (B_{MSY} bearing in mind that its proxy for pollock is $B_{35\%}$). The rationale stemmed in large part from concerns about the ecological impacts of low stock levels on predators of Pollock. The "intent" description for this scoring indicator refers both to this issue, and also to a need to take into account the effects of environmental variability. How might these two issues be reconciled?

There is strong evidence that the GOA ecosystem is highly variable and that this in turn impacts on population levels of individual species, and may also affect community structure (see discussion in preamble to Principle 2). The results in Appendix 3 and in Dorn et al (2003) suggest that this variability is an important feature of the dynamics of Pollock in the GOA, with population levels potentially fluctuating tenfold even in the absence of fishing. Although the system has only been observed through one of these cycles, it seems reasonable to suppose that such variability is a natural feature of this ecosystem. If so, then predators of species such as Pollock must also have had to cope with such variability in the past. They may well be adapted to such variability, and have a variety of mechanisms (such as prey switching) to deal with it. The results in Appendix 3 (Figure 1) suggest that fishing has served to accentuate rather than fundamentally change the nature of that variability. That in itself may be of concern – with a constant exploitation rate, the low points in the cycle would be lower with fishing than without it. On the other hand, the fact that stock level falls below an average $B_{35\%}$ level may not be of substantial concern, if such events are commonplace even in the absence of fishing. However it seems reasonable to suppose that there ought to be a "bottom line", a level below which it is undesirable for the stock to fall on the grounds of ecological impacts on the ecosystem, and hence below which exploitation should cease. Under the current GOA harvest strategy for Pollock, that level is 20% of average unfished levels. Given the apparent level of natural variability in the stock, and the calculation that, even with a maximum exploitation rate of $F_{75\%}$ (i.e. a target stock size of $B_{75\%}$) the stock would still fall below $B_{35\%}$ almost 20% of the time (Martin Dorn, unpublished data), a 20% bottom line seems not unreasonable.

Based on all the complex arguments presented above, the SCS evaluation team concludes that the fishery fails to achieve a passing 80 score for this indicator, due to the current low level of absolute abundance and its possible wider ecological impacts (especially for predators). However the evaluation team takes note of the possibility that much of the decline in abundance may be due to environmental factors, and that the stock appears in general to have been responsibly managed as far as exploitation rates are concerned. The team is therefore of the view that the score for this indicator does not fall below the 60 scoring level.

Two responses to the evaluation of this indicator in the draft evaluation report are worth recording here. Marz (2003) states:

"We strongly disagree with the team's analysis under this PI. The GOA stock should fall below the 60 SG level because its abundance estimates are dangerously low and below MSY. Your analysis involves gross speculation. The issue is not whether variability is a natural feature of the ecosystem, but how much has fishing changed the nature of that variability. This is impossible to assess definitively. As such, it is imperative to manage the fisheries in as precautionary a manner as possible regardless of what has caused the low stock size. This involves lowering TAC levels, if fishing is permitted at all. However, the Council recently *increased* the harvest level 31 percent despite the fact the GOA pollock biomass is low and below MSY. Further, relying on the strength of the 1999 year class is dangerous as many of the assumptions in calculating the stock estimate may be overestimated. Given the low biomass estimate, it would be more precautionary to leave more of the 1999 year class in the water to mature and grow.

As noted by Dayton et al. (2000), without reliable baseline data to compare the current state of the ecosystem to an unfished environment, the causes of ecosystem changes in a complex system can always be argued. Undoubtedly environmental forces play a large (though not well understood) role in determining the population dynamics of fish species, particularly on a year-to-year basis in a variable high-latitude marine environment, as do ecological interactions between species in the marine food web. But it must be said that no theory of "regime shifts" has shown an effect on any fish population as profound as that which is *assumed* in the stock assessment models and theory of MSY, which approximately doubles the estimated annual mortality on stocks such as pollock, by design (Field 2002)."

In response to several of the points raised by Marz, it seems to the evaluation team that Dorn's analyses do in fact address (if not definitively, but that is never possible) the extent to which fishing has changed the nature and extent of the natural variability in abundance. The recommended increase in the TAC levels reflects a more optimistic assessment, and discounts (rather than relying on) the strength of the 1999 year class. The increase comes about from proper application of the existing harvest strategy. It has already been noted that this has not been demonstrated to be robust to the type of variability in productivity evident in GOA pollock, but the condition at indicator 1.1.1.5 is designed to address this issue directly (and result in a more conservative harvest strategy if the evaluations indicate that is called for).

Pope (2003), one of the external reviewers of the report, made the following comment with regard to this scoring indicator:

"The assessment team clearly had problems with this indicator. Personally I would prefer it to refer to the limit reference point as specified by the tier rules rather than at an absolute level. Whether the tier rules (or for that matter B_{msy} based rules) are precautionary will be decided under the condition to 1.1.1.5. Similarly I would exclude predators' needs here but deal with them robustly in the appropriate place. This interpretation would lead to a passing score here. However, using the scoring guideposts as written I think the assessment team is correct to give no more than 70. Indeed the wording of 60 might suggest a still lower score but I think this might be unjust. The problem here underlines the difficulty of biomass limits with stocks subject to large natural fluctuations. The conditions specified seem reasonable."

Mindful of these views, and of the additional assessment reported in Dorn et al (2003), the SCS evaluation team stands by its original scoring for this indicator.

Condition

1. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions

about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation.

2. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the relative impacts of fishing on recruitment variability and stock abundance.
3. The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).

In addition to the above cited text we provided on the Draft Determination, we also stated the following on page 13:

> In addition, the discussion asserts that that B_{MSY} is used as a target reference point in the tier system, rather than a limit on p. 49. Then the discussion concludes that B_{MSY} is a limit reference point. As this PI is supposed to evaluate "limit reference points" the fishery should score below 60 on this PI (in addition to the GOA stock's low abundance levels). In addition, please read section 3 *Shortcomings of Reference Point Based Fisheries Management* at p. 46 in John C. Field, A Review of the Theory, Application and Potential Ecological Consequences of $F_{40\%}$ Harvest Policies in the Northeast Pacific, Prepared for the Alaska Oceans Network, November 2002. 101 pp., to understand our concerns about the inadequate treatment of uncertainty in reference point based fisheries management.
>
> Next, notwithstanding our disagreement with your analysis under this PI, your condition fails to include any timelines for any of the three requirements. See our comments under PI 1.1.1.5 to understand our concerns with the condition that you referenced under the No. 1 requirement for this PI. Also, you should require that the No. 2 and No. 3 requirements be met immediately.

The team clearly relied on Martin Dorn's explanation about the low stock size in concluding that natural variation is responsible for the low stock size. We question Martin Dorn's interpretation of the information. His explanation in terms of fishing versus natural mortality is "Perhaps a strong case can be made for the environment in this instance because harvest rates for GOA pollock have been demonstrably conservative for a gadid." (Appendix – 3, p. 1 (reference to figure omitted)). The words "perhaps" and "stronger" do not preclude fishing from being a factor, and perhaps a significant one at times. In addition, the statement "conservative for a gadid" is not sound because it assumes that all gadid stocks follow the same pattern. The GOA stock does not share the same natural population dynamics as the Eastern Bering Sea stock, let alone other gadid stocks.[586]

[586] The GOA and EBS ecosystems are different in many ways, from the physical features that impact energy flow through the system to species composition and dynamics of the ecosystem itself. For example, in the EBS, seasonal ice cover plays a central role in ecosystem dynamics (e.g., Hunt, Jr., G.L., P. Stabeno, G. Walters, E. Sinclair, R. Brodeur, J.M. Napp, and N. Bond, 2002. Climate change and control of the southeastern Bering Sea pelagic ecosystem. *Deep-Sea Res. II, Topical Studies in Oceanography*, 49, 5821-5853), but is not an important feature in the GOA. In the EBS, there was a ten-fold increase in gelatinous zooplankton between 1979 and 1997 (Brodeur, R. D., C. E. Mills, J. E. Overland, G. E. Walters, and J. D. Schumacher, 2000. Evidence for a substantial increase in gelatinous zooplankton in the Bering Sea, with possible links to climate change. *Fish. Oceanogr. 8*, 296-306) and more frequent extensive blooms of coccolithophorid plankton (e.g., Lida, T, I. Saitoh, T. Miyamura, M.

At a minimum, it is reasonable that fishing contributed to the decline in the GOA pollock stock size. Beginning in 1983, the year-to-year change in the ratios of model estimates to zero catch virtual biomass for both 3+ biomass and, more importantly, for female spawning biomass show a sharp increase (Dorn, 2003). Before 1983, the largest year-to-year change in the ratio had been 3% decrease, which occurred four times (1969-1970, 1971-1972, 1976-1977 (the regime shift time period), and 1977-1978). Between 1983 and 1986, the ratio of zero catch virtual biomass to model estimates for female spawning biomass decreased from 81% to 59%, or an average decrease of 5.5% per year. During this same time period, the three largest catches (with an average of 269,278 tons) occurred and these were primarily from Shelikof Strait during March as a joint-venture roe fishery. This suggests that the change might have been due to fishing pressure rather than natural environmental change alone.

The amount of unknown and uncertain information is great in assessing the status and dynamics of the GOA pollock stock. The evaluation team concluded that that the fishery failed to pass the 100 or 80 Scoring Guideposts, yet was not below the 60 Scoring Guidepost because of their belief that natural environmental factors account for the decline in abundance. This belief is questionable for the following reasons. First, the team has not established a reference biomass other than BMSY, whose accepted proxy for pollock is B35% which is 210,000 tons (or 216,000 if the time period for averaging is 1979-2002). Second, while a shifting baseline to compute BMSY is likely more realistic and should be developed, the team does not use such an index. Third, Dorn's (2003) information can be used to show that the GOA stock fails the 60 scoring level. Dorn's information provides clearly that the 2002 spawning biomass (142,000 tons) is below the B35% estimate (~216,650 tons), or is at ~ 23% of the virtual unfished biomass.[587] That the spawning biomass has been less than B35%is also clearly shown in Figure 1 (from Ianelli, 2003; where B35%, is slightly less than the B40% shown) and this condition has persisted since 1999.

In sum, while we do not have unequivocal evidence that fishing has caused the observed decline in biomass of GOA pollock, fishing mortality cannot be ruled out as a contributing factor to the decline. Spawning biomass has been below B35% since 1999, and that there has been a steady decline of female spawning biomass since 1994 from 589,000 to 325,000 tons, or ~ 55% (Dorn, 2003). Whether this ongoing decline results from natural causes and/or is related to fishing pressure, management has cause at least for being very cautious in setting quotas, if not declaring the stock overfished. This is not the case. The TAC increased 31% from 2003. In addition, the 2004 TAC equals the ABC level. Under the analysis for Principle PI 1.3.2, the Final Determination noted this practice of setting catch levels:

> the fact that the GOA TAC has tended to be set at the highest level permitted by the ABC in recent

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Toratani, H. Fukushima and N. Shiga, 2002. Temporal and spatial variability of coccolithophore blooms in the eastern Bering Sea, 1998-2001. *Prog. Oceanogr. 55*, 165-176); neither of these marked changes in the ecosystem has occurred in the GOA. While comparative studies and generic mechanisms or features (e.g., turbulence, transport and temperature) exist among regional marine ecosystems, each individual system has its own uniqueness. The relative abundance of pollock in the EBS (relative to the greatest number of fish over the length of the time series) has been above 85% since the early 1980's, whereas for GOA pollock it also peaked in early 1980's, but has markedly declined every year since and in 2001 was at ~ 30% (NRC, 2003. The decline of the Steller sea lion in Alaskan waters: Untangling Food Webs and Fishing Nets. National Academy Press, Washington, D.C. 204 pp.; stock dynamics in the two regions are different. Relatively conservative harvest rates in the GOA may have nothing to do with how actual harvests have impacted dynamics of the stock.

[587] For these calculations, we used the average value computed between 1979-2002 (619,000 tons) rather than 600,000 tons (average over the entire time series) in order to not include potential environmental effects due to the 1976/77 regime shift.

> years when the stock has been decreasing to all time low levels. (p. 107).

Further, under Principle 2, PI 2.1, the Final Determination states the following:

> In the absence of a better understanding about the effects of the fishery on these species, a more precautionary approach to constraining harvest from critical areas for predators would seem warranted. Setting TAC below the ABC is one way to be precautionary, but empirical evidence from these fisheries is that the TAC is only set significantly below the ABC when the stock size is exceptionally large (so that precaution is not a key issue). Another way to be precautionary would be to set ABCs using an approach that better incorporates ecosystem considerations. (p. 109). (*See also* PI 2.2.1, p. 110 for a similar discussion).

In addition, the Bering Sea / Aleutian Islands Final Determination expressed concern over setting the TAC level the same as the ABC level when the stock size is low because it is not precautionary:

> . . . the management of the pollock fisheries has allowed the fishing mortality rate to increase as stock declines. When pollock stock is high . . . the TAC has tended to be set well below the ABC, whereas with low stock the TAC has usually been set as high as the ABC permits. This could still be considered precautionary if the ABC already has taken into account the effects of the pollock fishery on other components of the ecosystem. However, ecosystem considerations are predominantly qualitative and therefore not used by the stock assessment in setting ABCs.
>
> Increases in fishing mortality as stock declines, allows the fishery to remove an increasing (though still small) proportion of the stock at smaller stock size. Since this may also reduce availability of pollock to other predators under decreased stock biomass, this could make stock recovery increasingly less likely as stock falls. (BSAI Final Determination p. 87).

It is very disappointing that the team scored the GOA pollock fishery high enough to pass muster under Principle 1 when the stock is below MSY and has experienced a sustained decline for thirty years. Whether the cause is natural variation or due to fishing exploitation or a combination of both, NMFS has failed to act in a precautionary manner by significantly reducing TAC levels or creating GOA pollock spawning reserves. Not only has the agency failed to take adequate action to rebuild the target stock, it has allowed the vast majority of the pollock catch to occur in endangered Steller sea lion critical. By certifying the GOA pollock fishery despite these very serious problems, the MSC is expressly approving NMFS' short-sighted management approach of a fishery that is teetering on the verge of collapse. This is unacceptable.

Nowhere does the Final Determination require reduced TACs, spawning reserves, or making permanent in the FMP the ad hoc policy of shutting down the fishery once the fishery is at or below B20%. It is absurd that GOA pollock can be considered sustainable and well-managed as an MSC-certified fishery when it is below MSY, especially when the decline has been occurring for decades and management has been unable to rebuild the stock. In fact, the 60 Scoring Guideline level provides that "Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent." There is no question that the GOA pollock stock is significantly below MSY. As such, the fishery should clearly fail this PI and the overall score for Principle 1 should be lowered. Until the stock recovers, there is no way this fishery should be certified.

If the fishery is certified, more rigorous conditions should be required such as significantly reducing TAC levels, creating pollock spawning reserves where no fishing occurs, and requiring the FMP be amended to prohibit fishing when the fish stock drops to B20%. Further, given the low stock size, any certification should only occur after the conditions are achieved.

Catch inside Steller sea lion critical habitat

In addition to recognizing the low abundance level of the target stock, in numerous locations the Final Determination notes the high catch levels within endangered Steller sea lion critical habitat and the lack of precautionary management despite the uncertain understanding about the relationships between sea lions and the pollock fisheries. The following excerpts reflect the team's recognition of the issue:

> Efforts to avoid possible local depletion in areas of particular importance for foraging marine mammals (Steller sea lions in particular) have been of uncertain efficacy, and it appears have done rather little to reduce the very high proportion of pollock catch taken from defined 'critical habitat' of Steller sea lions. Given the potential influence of the pollock fishery on Steller sea lion prey fields, and the fact that ongoing studies have not yet provided a firm understanding, the management appears not to be as precautionary as one might expect in a position of continued uncertainty.
>
> The continued high proportion of pollock catch taken in SSL critical habitat is of concern. . . . about 70% of this harvest is taken from within SSL critical habitat, although the value varies considerably from year to year. For example, in 1999 harvest inside CH was 82.8% while in 2002 harvest inside CH was 54.9%, but the lowest in recent years was around 50% in 1991 and the trend in this percentage from 1991 to 2003 shows no consistent direction of change over the period (Figure 2.1.b).
>
> An unpublished analysis of NMFS data on pollock in the GOA by Martin Dorn in October 2000 completed as part of the development of the 2000 Biological Opinion estimated from acoustic survey data that about 85% of pollock in the GOA occurred within SSLCH during the winter spawning period. He also estimated from bottom trawl research survey data that in summer about 75% of the pollock biomass west of 140 long. was in SSLCH. He inferred from these estimates that throughout the year most pollock in the GOA is within SSLCH. (p. 88-89).

In addition, under Principle 2 PI 1.2.1, the report states:

> Analyses of fishery patterns in 2002 indicate that the present RPA fishery mitigation plan allows catches in critical habitat to remain high or to rise to formerly high levels that existed prior to the determinations of jeopardy and adverse modification in the 1998 and 2000 biological opinions. (NMFS 2003 Supplement to the Supplemental October 2001 BiOp, pp. 23-24; Tables III-2,3,4,5,9; Figures III-1,2,3). Given that the competing hypotheses associated with availability of pollock in SSLCH cannot be sorted, the continued high harvest from SSLCH has attracted criticism from several environmental groups as being less precautionary than they consider appropriate, and provides a strong case for more and continued detailed research to test these hypotheses. (p. 95).

The Final Determination provides the following nexus between decreased food abundance and predator sensitivity:

> However, it may be useful to note that where studies have investigated responses of top predators to reductions in their food fish abundance, decreases of 70-80% in food fish stocks (i.e.

> approximately the situation currently existing with pollock in the GOA), have led to some dramatic reductions in predator densities or breeding performance. . . .
>
> These examples suggest that a 70-80% decline in pollock abundance in the GOA may be expected to affect foraging top predators that are sensitive to food availability. Although the sensitivity of the Steller sea lion to prey field reduction is not known, the fact that SSL has an energetically expensive mode of foraging, and carries little fat reserves, would tend to suggest that sea lions will be more sensitive to reduced prey availability than some other species. (p. 107).

Also, the Final Determination states:

> In passing we note that in the GOA, the TAC has usually not been reduced below the ABC when stock has fallen (so potentially reduces food for pollock predators), and indeed the % exploitation rate has increased in many recent years when stock has been smallest (though it was reduced in 2002 and 2003 due to higher uncertainties over stock assessment data and consequent precautionary setting of the ABCs). Therefore when the stock has been smaller, the TAC has been set on a single-species basis as high as the ABC would permit, yet this is the very time when a more precautionary TAC reduced in the light of ecosystem concerns might have been appropriate.
>
> In the context of impacts on Steller sea lions, the Sea Lion Protection Measures (SPMs) adopted by the NPFMC represent the main management tool intended to avoid impacts rather than limitations on ABCs or TACs (unless the stock falls to below 20% of unfished biomass in which case the fishery closes to avoid further depletion but this limit has not yet been reached in either the EBS or GOA pollock fisheries, although the GOA pollock stock has fallen to close to this threshold). The management strategy sets 'Reasonable and Prudent Alternatives' (SPMs) intended to constrain any impact of pollock fishing on Steller sea lions.
>
> Nevertheless, these actions in recent years have not stopped the fishery from taking a high proportion of pollock from areas within defined 'Critical Habitat' of Steller sea lions. (p. 110-111).

The report also states:

> The fact that it is unclear whether the fishery is the cause of declines in SSL populations is not a satisfactory reason for lack of action. The uncertainty over impact should have led to research to identify whether or not the fishery is the cause, and management should have responded in a timely manner and to introduce precautionary management until the cause-effect relationship had been resolved. . . .
>
> Furthermore, this is but one specific hypothesis relating to effects of the fishery on SSL prey fields; given the satellite tracking data indicating that SSLs may range over very large areas in search of food (National Marine Fisheries Service, 2001d), there are equally important questions yet to be tackled concerning how SSLs respond to reductions in pollock stock biomass, both at a local 'prey-field' scale and at a larger ecosystem scale. This is especially important given the current situation in the GOA where pollock biomass has declined to only about 29% of predicted unfished biomass. (p. 134-125).

Despite the team's concern about the ecosystem impacts of the GOA pollock fishery, especially when the stock is at an alarmingly low abundance level and when Steller sea lions have declined more than 80% in the last thirty years, the Final Determination fails to include conditions that require precautionary action. While the conditions under Principle 2 are required appropriately in response to PIs that score below 80, they do not go far enough to address the serious concerns that the report reflects. Until the questions are definitively answered about the relationship between the fisheries and Steller sea lion declines, the sea lions' foraging needs and critical habitat requirements, considering the low pollock abundance, the certification should require precautionary management actions such as significantly reducing TAC levels or curtailing all fishing in critical habitat and instituting pollock spawning reserves. This has not happened in the Final Determination. Considering the continued decline of sea lions in the region, pollock's pivotal role in their diet and the low abundance level of GOA pollock, managing this fishery to avoid adverse ecosystem impacts is critical. The Final Determination recognizes this issue but fails to take the next step and require stringent conditions to ensure that the certification meets the MSC Standard.

Lack of compliance with domestic law

The Final Determination erred in its analysis of Principle 3, PI 2.2 and scored the fisheries higher than deserved. The team should have found that the fisheries failed this PI according to the 60 Scoring Guidepost.

Principle 3, PI 2.2 states the following:

> The fishery is managed and conducted in a manner that respects domestic law *[Relates to MSC Criterion 3.16]*
>
> Elements considered in scoring include:

- Consistency and quality of compliance with federal law (efforts to assure compliance, reasons for incidents of non-compliance, severity of consequences of non-compliance)
- Integration of compliance requirements among the multiple domestic legal regimes that apply to the fishery

<u>100 Scoring Guidepost</u>

- The management system is in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found at any time to be in willful violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the pollock fishery
- No officer or agent of the management system, including its component entities, has at any time been found to be in contempt of any domestic court of jurisdiction on any matter related to performance of official duties on behalf of the management system concerning the pollock fishery
- The management system regularly and consistently seeks and uses appropriately the advice of experts in domestic law, including independent experts

<u>80 Scoring Guidepost</u>

- The management system makes consistent, good faith efforts to be in compliance with all substantive and procedural aspects of applicable domestic law
- The management system, including its component institutional entities, has not been found repeatedly by any domestic court of jurisdiction to be in violation of any significant aspect of any domestic law related to protection of the human or natural environment, individual species, ecosystems, or fishery dependent communities
- The management system has access to and makes use of experts in domestic law.

<u>60 Scoring Guidepost</u>

- The management system fails to reliably monitor and assure its compliance with all substantive and procedural aspects of applicable domestic law

- Harvest management decisions made by fishery managers are regularly overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law

The team scored this PI a 62 and stated the following rationale:

> The evaluation team, mindful of the significance of this indicator, solicited and received specific advice from legal counsel for APA, NOAA, and conservation stakeholders. Their advice led us to conclude that the management system generally respects domestic law -- and that is what this indicator sets as a minimum threshold in order that the fishery be eligible for certification. This indicator does not require that the fishery management system be in perfect minute-to-minute compliance with every single piece of substantive and procedural law that governs the pollock fishery. It would elevate form over substance to set the bar that high and we did not do so. But compliance with the law is certainly the most revealing evidence of respect for the law, and the evidence here is very problematic.
>
> The management system's record of compliance with domestic law, as evaluated over at least the last decade, reveals a number of instances where federal fishery managers have taken actions relevant to the pollock fishery that were challenged and overturned in court. When a federal court concludes that an agency action does not fulfill the requirements of a law, the agency is by definition "not in compliance" with applicable law.
>
> For example, the U.S. District Court for the Western District of Washington has ruled that NMFS is not in compliance with NEPA with respect to North Pacific groundfish management. The U.S. District Court for the District of Columbia has ruled that the NMFS is not in compliance with NEPA with respect to promulgation of rules for designation of essential fish habitat as required by the Magnuson-Stevens Act. The U.S. District Court for the Western District of Washington has repeatedly found important infirmities in NMFS' compliance with the Endangered Species Act in connection with North Pacific groundfish fisheries' impact on Steller sea lions.
>
> Disagreements among stakeholders about how the fishery ought to be managed, or disagreements between stakeholders and regulators, no matter how intense, do not of themselves demonstrate that the management system is failing to respect domestic law. Indeed, it may easily reveal that the system is working exactly as the law intends. Complex laws and complex facts, such as those associated with the pollock fisheries, can make compliance difficult despite good faith efforts to meet legal requirements. That said, a pattern of instances where agency decisions are overturned in court on the same or similar grounds does give rise to the inference that the agency has failed to give the law the respect it is due. And the basis on which an agency is found out-of-compliance can, and did in this case, reveal factors that were relevant to scoring of this indicator.
>
> The evaluation team has a concern that is directly related to NMFS' approach to the most recent biological opinion on Steller sea lions (the "2001 BiOp"). The team reviewed the 2001 BiOp, the BiOp that preceded it (the "FMP BiOp"), and related technical reports and we were not able to discern the scientifically determinative character of the new information--satellite tracking data on the movements of several sea lions over a limited period of time--cited by NMFS as the basis for authorizing significant changes in the location and timing of the pollock fisheries, particularly insofar

as those changes resulted in increased fishing in areas designated as critical habitat for Stellar sea lions.[588]

The management system's receptivity to and use of the newly reported sea lion tracking data gave the evaluation team the impression of having been based on a less rigorous standard of scientific proof and conservatism than the standard normally applied within this system to new research results or other information submitted in connection with management of the fishery.

The conservation stakeholders challenged the 2001 BiOp in federal court citing, among other alleged shortcomings, the same concern noted by the evaluation team. The federal court upheld the conservationists' challenge on that very ground, finding that NMFS had not performed "the necessary analysis of the impact of the [new biological opinion's recommended harvest criteria] on Steller sea lions, their prey, and their critical habitat." The court ordered NMFS to prepare the analysis missing from the 2001 BiOp.

It is among the most worrisome signs of failure to respect domestic law that an agency would not properly analyze or explain the basis for a major decision on a controversial matter that the agency had litigated and lost before (i.e., sea lion conservation). NMFS itself has testified before the U.S. Congress that the agency is well aware that it has a chronic problem successfully meeting the terms of NEPA and the ESA and that the courts were taking a dim view of the agency's administration of the law (Hogarth, 2002; Dalton, 2002). A former NMFS director testified before Congress that:

Beginning in 1996, legal challenges have risen from an average of 1 or 2 each year to a current high of 26 in 2001. While much of the rise has been blamed on enactment of the Sustainable Fisheries Act, a larger proportion of the new cases have been challenges under the National Environmental Policy Act, the Endangered Species Act and the Regulatory Flexibility Act….

More troubling than the cases themselves has been the decline in the ability of NMFS to prevail when agency decisions are challenged. Before 1994, the government lost very few cases. In recent years, however, this record has been reversed and in the last four years the agency has lost more cases than it has won. This gives rise to expectations of success by other potential litigants,

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[588] The final report contains the following footnote in reference to the above noted text:

The management system's receptivity to and use of the newly reported sea lion tracking data gave the evaluation team the impression of having been based on a less rigorous standard of scientific proof and conservatism than the standard normally applied within this system to new research results or other information submitted in connection with management of the fishery. The assessment team heard from many individuals both inside government and out that the data was applied in an expedient way through a less-than-open process tailored to prevent the economic harm feared from certain proposed area closures. Others we interviewed defended the process and the use of the data. On balance, the team felt the critics had the more convincing perspective. See the detailed discussion of the tracking data issue under Principle 2, Indicator 1.2.1. (See fn. 60 on page 175 of Final Determination).

and issues that might have been resolved by the give and take of the regulatory process are remanded for consideration by the courts (Dalton, 2002).

NMFS' problem stems from many sources, some of which are in the agency's power to change and some of which are not. The evaluation team's perspective on this indicator is heavily influenced by the equivocal impression given by NMFS officials interviewed by the evaluation team, concerning the agency's determination to take measures in-house to improve its ability to meet the terms of those laws. In brief, some officials clearly believe that the agency's compliance problem results from bad laws, hostile stakeholders and litigants, unreasonable judges, or all of them together. Other officials assign fault to the agency's complex internal structure, diverse and evolving mission, and limited resources.

The evaluation team is aware that NMFS, with assistance from NPFMC and others, is taking steps to bring the management of the fishery into compliance with NEPA, ESA, and the Magnuson-Stevens Act. Importantly, NMFS, APA, and the conservation stakeholders recently agreed to settle pending litigation on terms that have been adopted by the federal court and entered as an order to the parties, effective April 1, 2003. The order covers all of the significant NEPA and ESA compliance matters that have been the subject of recent disputes among the parties. The settlement among the parties requires NMFS to bring the management of the North Pacific groundfish fisheries into full compliance with NEPA and the ESA (as to the issues under litigation) within certain timeframes set for this year and in 2004. It appears that the agency is on schedule to complete the analyses required under the settlement, although the PSEIS received voluminous adverse comment from some stakeholders.

The evaluation team notes that the PSEIS in preparation for the groundfish management plan is quite impressive in its scope and depth and analytical sophistication. Indeed, the team has relied extensively on the first draft of that document in performing our evaluation of the fishery. The PSEIS, when finished as ordered by the court, may come to serve as an analytical resource that will support better-informed and even more successful management of the pollock fisheries. The PSEIS may come to represent a transformational force in the history of the pollock management system, a tool that allows the Council and NMFS to integrate ecosystem, listed species, habitat and other considerations fully into the fishery management planning process. It has that potential.

But the agency has not yet completed the work ordered by the court and a great deal of difficult work and decision-making remain to be done. NEPA does not require decision makers to make good decisions about implementing the Magnuson-Stevens Act or ESA; it simply requires that they have the information to do so if they choose to. The pattern of past compliance difficulties raises the question whether the management system will indeed perform its obligations in a manner that shows the measure of respect for domestic law contemplated by this indicator.

Condition

To improve the deficiencies in performance for this indicator, the fishery is required to remain in compliance with the pertinent outstanding orders of the U.S. District Court for the Western District of Washington and the settlement reached before the U.S. District Court for the District of Columbia in the EFH controversy. The fishery must, in particular, meet the terms of the Order dated April 1, 2003, which sets specific deadlines in 2003 and 2004 for completion of ESA- and NEPA-related analyses and procedures. That Order requires NMFS to revise its 2001 Steller sea lion biological opinion not later than June 30, 2003 and to issue the final PSEIS (and a decision based on the analysis) not later than September 1, 2004. The revised Steller sea lion biological opinion was signed on June 19, 2003.[589] As of May 2004, NMFS reports that it expects to release the final PSEIS in June 2004, and will issue a final Record of Decision based on the EIS not later than September 1, 2004.[590]

The evaluation team advises that it will be strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species unless the impacts of those activities on listed species are analyzed and documented in a manner consistent with the high standards of scientific technique and public involvement of which the fishery management system is capable. The scoring of this indicator will be revisited, and likely revised downward, if a court finds that the fishery is being managed in a manner that fails to comply with any significant provision of applicable law, whether or not the issue in question has been the subject of prior disputes.

While the above analysis indicates that the team comprehends the significance of the litigation history involving the pollock fisheries and NMFS and the Council, the Final Determination fails to score properly the fisheries according to the PI's scoring guideposts. The distinction is absurd that the fisheries pass this PI because the management system "respects" the law, although it has demonstrated a severe problem in complying with the law.[591] As the report notes the best way to show that you respect the law is to actually comply with the law. The protracted litigation history to protect Steller sea lions and the ecosystem from the fisheries' impacts and the numerous court rulings against the management of the pollock fisheries should speak volumes about this PI and result in a failing score.

The 60 Scoring Guidepost provides that:

- The management system fails to reliably monitor and assure its compliance with all substantive and procedural aspects of applicable domestic law
- Harvest management decisions made by fishery managers are regularly overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law

These bullets perfectly exemplify the management system situation in the North Pacific. The team should review the legal history that we have provided in previous comments. This will demonstrate that NMFS and the Council failed "to reliably monitor and assure its compliance with all substantive and procedural aspects of" National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). The comments should illuminate that the management decisions regarding the pollock fisheries have been "regularly overturned or disallowed upon review by" the federal district court "based on the same or substantially similar (i.e., chronic) violations of" NEPA and the ESA.

The team recognized the fisheries' and management system's significant problems in complying with this PI. However, the Condition required to address the fisheries' deficiencies regarding this PI is incredibly troubling. The first part of the Condition for this PI fails to add any new requirement to the already existing legal requirements as set out in the April 1, 2003 court order. Regarding the statement in the second part of the condition that the team "will be

589 http://www.fakr.noaa.gov/protectedresources/stellers/biop2002/703remand.pdf
590 http://www.fakr.noaa.gov/sustainablefisheries/seis/news13.pdf
591 When discussing Principle 3, PI 3.5, the Final Determination notes the "management system's present lack of compliance with NEPA, as determined by the federal courts." (p. 195).

strongly inclined to reconsider the score for this indicator if harvest regimes are set for the 2003-2004 fishery that have the result of placing harvest activities in areas of designated critical habitat for ESA-listed species," in our comments on the Draft Determination we urged the team to require NMFS to provide immediately this information to determine if harvest regimes for the upcoming fisheries will allow catch in Steller sea lion critical habitat. We also asserted that if the team scored the fisheries above the 60 SG level and thus required a condition, it should require management measures that require more precaution given the significant legal compliance problems to date. "This includes reduced ABC and TAC levels, including adequate consideration of uncertainty, and no trawl fishing in SSLCH." (Comments on *The MSC Assessment Report for the United States Gulf of Alaska Pollock Fisheries, p. 83).* In the Final Determination, the team failed to alter its analysis or the associated Condition.

This is particularly distressing because the failure to comply with domestic law is the fisheries' and management system's most obvious weakness because it has already been extensively documented and adjudicated by the federal court. The team's failure to include a condition of substance that requires serious change in the way these entities do business is to say the least distressing. It raises the question of whether the team intended to give away this certification because it failed to take the opportunity to require change regarding the PI where the fisheries scored the lowest in the entire assessment.

Conclusion

The MSC assessment process for the Alaska pollock fisheries has been a long and time-consuming process. We are disappointed in the team's decision that these fisheries should be certified according to the MSC Standard. For the reasons stated in our previous comments and in this Objection, the team made a serious mistake in its Final Determination to certify the GOA pollock fishery. It is a grave error to certify a fishery that:

- is currently below the MSY level, with the lowest levels of spawning biomass since the early 1970s and has been in nearly continuous decline since the mid-1980s,
- has significant ecosystem impacts, and
- has staggering management problems.

The pollock fisheries and their management are not models for the world's fisheries. In so many ways, their problems provide examples of how not to conduct fisheries. We sincerely hope that the certification team reconsiders its decision and ultimately concludes the Alaska pollock fisheries do not deserve to bear the distinction of MSC certification and its label. We fear that a decision to certify will haunt the certification team and the Marine Stewardship Council.

SCIENTIFIC CERTIFICATION SYSTEMS

Scientific Certification Systems, Inc.
Headquarters
2000 Powell Street, Suite 1350
Emeryville, CA 94608
Tel: 510.452.8000
Fax: 510.452.8001
http://www.scscertified.com

Chet Chaffee
2004 Sunnyview Lane
Mountain View, CA 94040
Tel: 650-969-1366
Fax: 650-969-4731
chaffe3@attglobal.net

24 September 2004

Stacey Marz, Esq.
Consultant to Trustees for Alaska
308 G Street, Suite 219
Anchorage, AK 99501
(907) 929-9372 phone; (907) 929-1562 (fax)
stacey-marz@gci.net
(sent via email)

Stacey:

This letter and the attached document are being submitted to Alaska Oceans Program, Greenpeace International, and National Environmental Trust by Scientific Certification Systems, Inc. as a formal response to the report entitled "OBJECTION to FINAL DETERMINATION TO CERTIFY THE GULF OF ALASKA POLLOCK FISHERY" received by SCS on 4 September 2004.

As with the BSAI objection, we acknowledge that the process has been extremely time consuming for you and your colleagues. Your many hours of work, phone conversations, email exchanges, and filing of reports with SCS over the past 3 years is a testament to your professionalism and dedication. While we would probably have been able to dig up all the information eventually, your work has greatly enhanced and helped our assessment

As before, if you are dissatisfied with our response you have the right and opportunity to re-file your objection with the MSC for further review and consideration. This must be accomplished within 14 working days of receiving this response. If you receive the SCS response on 27 September 2004, as you most probably will due to the fact that this is coming over the weekend, I calculate that you will need to re-file with the MSC by end of day on 15 October 2004.

Should circumstances dictate the need for you and your colleagues to re-file your objection over the GOA pollock fishery assessment, we will urge the MSC to merge the two objections and hear them together to simplify discussions among all concerned parties. We hope you agree and will support this proposal.

Sincerely,

Chet Chaffee
Scientific Certification Systems, Inc.

SCS RESPONSE
TO
"OBJECTIONS TO FINAL DETERMINATION TO CERTIFY THE GULF OF ALASKA POLLOCK FISHERY"

This document is the response of the assessment team convened by Scientific Certification Systems, Inc. (SCS), to evaluate the Gulf of Alaska (GOA) pollock fishery ("Assessment Team") objection received on 4 August 2004 from the Alaska Oceans Program, Greenpeace International, and National Environmental Trust (hereafter "conservation stakeholders" or "Objectors") regarding the Assessment Team's *Report on the United States Gulf of Alaska Pollock Fishery* ("Final Report").

This report was advised by all member of the assessment team (Dr. Chet Chaffee, Mr. Tom Jensen, Dr. Tony Smith, and Dr. Bob Furness). Much of the objection submitted to SCS on the GOA pollock fishery is a repeat of issues stated in the objection to the findings on the Bering Sea and Aleutian Islands pollock fishery. Where the issues are the same, this report adopts the same explanation and language provided in the SCS response on the BSAI fishery. For the two new issues identified -

- the low stock size of GOA pollock;
- the high catch in Steller sea lion critical habitat -

SCS has provided specific responses.

As in the BSAI fishery, SCS asked Tom Jensen, a partner in the nationwide law firm of Sonnenschein Nath & Rosenthal heading the Washington D.C. based environmental and natural resources practice, to take a significant role in drafting this response. SCS asked Mr. Jensen to provide this assistance not only because of his in-depth knowledge of environmental law in the United States, but because he is the only practicing attorney that has ever participated in an MSC assessment process and an MSC objections process. Mr. Jensen's in-depth knowledge of the procedures and processes followed by the Marine Stewardship Council (MSC) to address filed objections comes from participating as a member of an MSC objections panel responding to an objection filed against a determination made for Patagonia Toothfish.

For the record, we note that our analysis of the GOA pollock fishery was heavily influenced by the conservation stakeholders. The conservation stakeholders supplied the Assessment Team with information on most topics and responded to our many requests for input over the 2-3 year period of the assessment. The assessment report authored by the SCS assessment team is a testament to the input received by SCS. A reader of the Final Report will find on almost every page of the chapter on the actual assessment, substantial evidence of the conservation stakeholders' affirmative influence. We endeavored at every juncture of the assessment report to directly cite the information and evidence presented by stakeholder groups and the assessment client and supporting agencies, and to explain our consideration of the information in our final judgment. We are deeply indebted to the conservation stakeholders for their contributions to the pollock assessment process.

SCS made the argument in its response to the BSAI objection, that many of the issues raised in the objection were real concerns, numerous of which are shared by the assessment team. However, many of the concerns raised were about issues outside the remit of a certification body or a fishery assessment team. Where the GOA objection repeats the same exact concerns as in the BSAI fishery, SCS presents the same arguments made in our response to the objection on the BSAI pollock fishery.

SCS General Response to the Objection

To start, SCS would like restate some of the same arguments we made in response to the BSAI objection as they are generally applicable to some of the same concerns raised in the GOA objection.

> The procedure established by the MSC to allow affected interests to "object" to the determination of a certification body does not automatically guarantee a change in the draft determination from an initial objection or from further processes that take it out of the hands of the certifier and place it the hands of an MSC established "objections panel." The objecting party needs to show reasonable evidence of procedural or substantive error in the course of the assessment. We are aware, of course, that the controversial nature of the pollock fishery and the institutional interests of many of the parties involved in the MSC process make it likely that the objections process will continue through the convening of an objections panel. If such a panel is ultimately convened, we do not envy its members the task they will bear.
>
> There can be no pretending about the problem that an objections panel will face if the affected parties pursue this objection further. We do not believe the Objectors have presented any information identifying procedural or substantive failings within the scope of the Assessment Team's responsibilities.
>
> It is suggested that the Assessment Team did not properly consider actions that affect future conditions in the fishery or the management system. It is not as if the Assessment Team turned a blind eye to the potential that certain things might occur in the future, such as new decisions by the federal courts. The Final Report specifically includes numerous references to potential actions by the fishery and its managers, and we set conditions or made recommendations that are framed to deal with alternative prospective scenarios. The Assessment Team looked as far over the horizon as feasible, particularly given the MSC-imposed requirement that the fishery undergo periodic re-evaluation. An assessment decision cannot be kept open indefinitely, at least under current (or reasonably conceivable) MSC rules. There will always be new things happening after the things happen that occur within the time frame of the initial analysis. The MSC has a process to deal with such post-hoc events, and the objections process is not it.
>
> Two private consultants recently conducted reviews of the MSC process. Oddly, the Objectors ask that the assessment be judged in light of those reports. The consultants' opinions of the MSC program offer no evidence one way or the other as to the judgment of the Assessment Team on the fit between the pollock fishery and the MSC Principles

and Criteria or whether the team followed MSC rules. Again, the MSC surely has a process in place to deal with the consultant reports, but the objections process is not it.

The Objectors point to many disagreements with the Assessment Team on certain issues, such as the proper meaning of "management system" or "respect for domestic law." But the Objectors have not shown any instance where the Assessment Team failed to consider their views or prevented full communication among all the parties on those issues. Indeed, the overwhelming majority of the text of the objection is simply cut and pasted from previous documents previously submitted to the Assessment Team and, as such, it shows how robust the dialogue has been. The fact that the Team and the Objectors disagree reveals the complex and controversial nature of this fishery, but it is not a sign of error by either party. The MSC surely has a process available to give even greater influence to the perspectives of conservation groups (or others) in the administration of MSC programs, but the objections process is not it.

The task of an MSC objections process is to make sure the assessment team followed the MSC's rules and did not commit significant errors of judgment. We understand that from the conservation stakeholders' points of view, this alone is a difficult matter to interpret, since the conservation stakeholders have noted on numerous occasions that the MSC certification methodology description often lacks the specificity required to determine what processes are necessary and that there is a lack of written documentation on the proper interpretation and use of the MSC standards by certification bodies. As a result, the objections process in this case will be under tremendous pressure to do much more than review the certification body's actions by serving as the venue in which to litigate, at a minimum, all of the problems that conservation stakeholders have with the MSC itself, commercial fishing generally, and the pollock fisheries in particular.

The Assessment Team believes strongly that the conservation stakeholders have legitimate concerns about many matters that deserve to be taken very seriously by the MSC. The Assessment Team has done just that, and taken the conservation stakeholders input at all times very seriously. From the beginning of the assessment, SCS as the certification body of record took steps to go well beyond MSC processes to include stakeholders, even to the point of conducting a long and drawn out process of stakeholder consultation to select the assessment team, and then selecting Tom Jensen directly in response to comments from Trustees for Alaska stating concern about assessment team expertise on legal matters associated with US fisheries. We also believe that the pollock fishery entered into the certification process in the understanding that it would be objectively and competently assessed under the MSC Principles and Criteria. That is the only question at this point. Was the GOA pollock fishery properly assessed? This should also be the only question before an MSC objections panel should these proceedings continue.

SCS Responses to Points of Significance Raised in the Objection

The objection on the GOA pollock fishery received by SCS dealt with several "points of significance" as follows:

- the failure to include scores and weights on PIs in the Draft Determination;
- the erroneous interpretation of what constitutes the "management system";
- the low stock size of GOA pollock;
- the high catch in Steller sea lion critical habitat;
- insufficient treatment of the litigation history and adverse legal opinions against the management system and fishery.

Three of these concerns were raised in the BSAI objection in substantially the same form, and are therefore answered in a similar manner. Below are our responses to these issues. Although not necessarily provided in order or individually, our responses go to the intent and the content of the issues.

The Failure to Include Scores and Weights on PIs in the Draft Determination

The Objectors in the GOA objection raise the same points as those raised in the BSAI objection, using substantially the same language. Since the issues are substantially the same, SCS believes the response it provided to the BSAI objection is appropriate and to the point and is therefore restated in this report only for the GOA pollock fishery.

> The objectors clearly state their dissatisfaction with the fact that weights and scores were not provided in the initial drat of the assessment report released for public comment. This neither speaks to a procedural or a merit objection. It merely states dissatisfaction with MSC approved processes, which as we stated in our general comments, is something that needs to be dealt with, just not in the objections process. Regardless, it may be instructive to the objectors and any future deliberations about the GOA pollock assessment to state the requirements as they now stand and provide a brief history of their inception.
>
> The certification requirements at the time of the signing of the pollock contract did not require public disclosure of the draft report for public comment at all, let alone disclose weights and scores. Only in July 2002 did the requirements for public disclosure and public comment get instituted through an imposed change in the MSC process – the implementation of an Objections Procedure. Prior to July 2002, the MSC did not have an express Objections Procedure. The enormous pressures put on the MSC during an objection to the Hoki fishery certification forced the MSC to create a policy. In July 2002, the MSC finalized an objections procedure and then required that all fishery certification assessments abide by the new policy, regardless of the fact that some fishery assessment, such as the GOA (and BSAI) pollock fishery, agreed by contract to undergo an MSC assessment that did not include this requirement. The change in this requirement put enormous financial pressure on certification bodies that now had to meet a different set of requirements for both drafting MSC reports and revising MSC reports based on a whole new set of comments, even though the existing contracts and agreed budgets did not take these procedures into consideration. It also put fishery clients in a precarious spot. The client (APA) for the GOA pollock fishery assessment has argued

vociferously that the implementation of new requirements mid-stream has caused them both financial and public relations losses. However, the MSC still required that SCS follow the new procedures.

SCS requested advice from the MSC on the specific requirements under the new (July 2002) Objections Procedures. It became evident that the MSC did not have fully written procedures or guidance on what was to be included or excluded from a fishery assessment report made available for public comment. By precedent, one can determine that the MSC initially decided that weights and scores would not be part of the report reviewed by clients or stakeholders, but only by peer reviewers (see Patagonia Toothfish). In fact, the MSC equivocated in its response to SCS stating that is was not a direct requirement. SCS therefore proceeded to follow original MSC requirements and MSC set precedents in the absence of more specific and direct guidance. Dissatisfaction with this part of the process is therefore something that needs to be addressed to the MSC. In fact, the MSC has further revised its certification methodology (version 5 April 2004) which contains a bit more explicit language around objections procedures.

Low Stock Size

The Objectors restates concerns that were raised during previous discussions with stakeholders, and in the response by Marz to the draft determination. In summary, the concern expressed in the objection is that the GOA stock has been declining in abundance for two decades, and more specifically, that the fishery fails to meet the 60 scoring benchmark for performance indicator 1.1.2.1 because the stock is currently below the B_{MSY} reference level. These concerns were carefully considered by the assessment team at the time, and having reviewed them again, the assessment team does not find cause to alter its determination.

The essence of the concern is that the stock is currently below the proxy for B_{MSY} which is currently 35% of unfished spawning biomass ($B_{35\%}$). If this were clearly the case, then the fishery would not score at or above the 60 benchmark, and would fail overall certification. The fishery apparently fails this benchmark, because the assessment conducted under the current Tier 3 rule estimates B_{MSY} as an average value over the period 1978 to 2003. Under this analysis, the current stock size does fall below this “average” B_{MSY} reference level. However the same assessment report (Dorn et al, 2003) also contains a separate analysis that attempts to account for the variable nature of the ecological system in which the stock is found. More specifically, this analysis shows how the stock size would have changed in the total absence of fishing, assuming that recruitment is mainly driven by environmental factors (although allowing for an effect of stock size on recruitment). In this analysis, the current stock size is well above the B_{MSY} reference level, where B_{MSY} (or in this case its agreed proxy $B_{35\%}$) is calculated as a moving quantity and not as an average level over a long period of time. The key question then becomes – which interpretation of B_{MSY} is the more appropriate for this stock?

In addressing this question, the assessment team was mindful of its own statement of intent for performance indicator 1.1.2.1, which was clearly stated in the original promulgation of the performance indicators and scoring guidelines. In full, this statement of intent reads (emphasis added):

> "The intent is to assess whether the stock is currently "overfished". There is no internationally agreed standard to define this. A recent FAO view is that target stocks should generally be maintained above B_{MSY}, which should be used as a limit reference point. An alternative (but not generally accepted) view is that explicit allowance should be made for predators by increasing target and limit levels well above B_{MSY} (e.g. the "CCAMLR" strategy). *Stock levels can also fluctuate due to natural environmental variability, and this needs to be taken into account. In this regard, B_{MSY} is an equilibrium concept and is not easily defined for a naturally fluctuating stock. In the absence of precise or agreed definitions or standards, expert judgments will be made based on the following guideposts.*"

While citing all of the rest of the text for the assessment of scoring indicator 1.1.2.1 in the objection, the Objectors fail to cite this text, or to note its implications. These implications are very fully discussed and described in the text of the final determination, including a direct response to the issues raised by Marz (2003).

The further points that are raised in the Objection include the following:

1. That fishing has contributed to the decline in the GOA pollock stock size.
2. That the assessment team has not established a reference biomass other than B_{MSY}.
3. That, while agreeing that a shifting baseline to compute B_{MSY} is likely more realistic and should be developed, the team does not use such an index.
4. That Dorn's (2003) can be used to show that the GOA stock falls below the $B_{35\%}$ estimate and so fails the 60 scoring level for indicator 1.1.2.1.
5. That a more precautionary approach to setting TACs should have been adopted in the face of the environmentally driven decline.

Our response to each of these points is as follows:

1. The assessment team has not argued that fishing has not also had a significant influence on stock sizes. Indeed Dorn's (2003) analysis directly compares the stock history in the presence and absence of fishing and concludes that by 2003 the 3+ biomass was at 59% and the spawning biomass at 44% of where it would have been in the absence of fishing. This is clearly stated in the final determination.
2. The assessment team accepted $B_{35\%}$ as a suitable proxy for B_{MSY}.
3. The shifting baseline used to determine the reference level is the stock size in the absence of fishing, as used in Dorn's (2003) analysis. While this is clearly not the only option, and could perhaps be improved on (for example by using a running average over a selected number of years), it is far closer to a reasonable approach that takes account of the fact that "stock levels can also fluctuate due to natural environmental variability" than assuming a fixed reference level over a 25 year period that clearly spans a major change in the productivity of the stock.
4. The analysis presented just repeats the assumption that there has been no change in the productivity of the stock and takes no account of fluctuating recruitment levels.
5. We do not necessarily disagree with the statement. However the condition imposed for performance indicator 1.1.5.1 is clearly aimed at addressing this issue, by assessing the robustness of harvest strategies to the types of cyclical changes in productivity evident for pollock and many other North Pacific fish stock, and by choosing harvest strategies that are

robust to such changes. The statement itself is not cause to fail the fishery for performance indicator 1.1.2.1.

Catch Inside Steller Sea Lion Critical Habitat

For this issue, the key point that is made is that while the SCS assessment team has done a good job recognizing that there could be potential problems from the take of pollock in Steller Sea Lion Critical Habitat (SSLCH), the assessment team has not placed restrictive enough conditions on the fishery such as curtailing fishing through significantly reduced TAC levels, stopping all fishing in SSLCH, or setting up pollock spawning reserves. No new evidence is presented that the current harvest rates from SSLCH is causing significant impact on SSLs, nor do the Objectors claim that any such evidence exists. Instead, the Objectors argue that in the absence of clear scientific evidence, a precautionary approach should be adopted. The Objectors view of what the precautionary approach should be is clearly stated: "………..the certification should require precautionary management actions such as significantly reducing TAC levels or curtailing all fishing in critical habitat and instituting pollock spawning reserves." Clearly, the essence of the objection is what properly constitutes a precautionary approach. The fact that the Objectors disagree with the assessment team does not equate to the assessment team being wrong. In examining the evidence, the assessment team sought to understand what is known and what is not known, and then determine whether the evidence showed compliance with the MSC standard and the set of performance indicators and scoring guideposts used to assess the fishery. The assessment team concluded that it was appropriate, based on the evidence, to require additional research to determine whether the fishery impacts SSL, and that the research should be carried out as a matter of urgency. The assessment team also noted that it would require the management system to be responsive to the research findings. The assessment team feels that it has set measured and reasonable conditions, and that it would be inappropriate to set much more severe conditions where the balance of scientific opinion (e.g. scientific experts such as the National Research Council (NRC) panel of experts) has indicated that factors other than pollock stock may be more likely to be the cause of the SSL decline. Under the circumstances, we believe it is quite appropriate to require research to provide a clear test of the hypothesis that pollock fishing adversely affects SSL. The experiments required are considered very difficult, and according to the applicant (APA), very expensive. Given the body of evidence we were presented on expert scientific opinion that the effect of fishing on pollock is a less likely cause of SSL declines, it would not seem defensible to require draconian constraints on the fishery just in the unlikely event that the experts may be wrong. Should anyone suggest more severe conditions, and the MSC or others may suggest this as appropriate, the question will be how much to reduce fishing either in amount or by geographic location. Any such limit that might be added as a further condition would be entirely arbitrary, unscientific and of unknown efficacy. It would, therefore, be impossible to justify any particular figure as a limit, except as a precautionary response to a concern that is based on feelings and not on objective underpinning science. Instead, the assessment team found it more prudent to require experimental research and then related management actions so that the fishery does what is necessary and acts as required to protect SSLs through good fishery management.

Erroneous interpretation of the "management system" and insufficient treatment of the litigation history and adverse legal opinions against the management system and fishery.

(The section in the body of the filed objection is actually titled, "Lack of Compliance with Domestic Law")

The Objectors again raise the same points as those raised in the BSAI objection, using substantially the same language. Since the issues are substantially the same, SCS believes the response it provided to the BSAI objection is appropriate and to the point and is therefore restated in this report only in response to the GOA pollock fishery.

> In this section we deal with the two criticisms together as they are intimately tied together.
>
> The Objectors raise objections that pertain specifically to the Assessment Team's interpretation of the meaning of "management system" and "respect for domestic law"--key terms taken from the MSC's Principles and Criteria.[592] The objections are not new and, indeed, the Objectors quote extensively from earlier materials submitted by them or produced by the Assessment Team on these matters. The Objectors essentially restate, with additional emphasis, points that they have pressed vigorously throughout the pollock assessment process. The objections do not contain new information or other material that has not previously been conveyed to and considered by the Assessment Team.
>
> The Assessment Team agrees with the Objectors that our interpretations of the term "management system" and the phrase "respect for domestic law," and our application of those interpretations to the evidence presented to us significantly influence the outcome of this assessment. We said so in the final report and we acknowledge it again now: It is possible that the fishery might not receive a score adequate for certification under the MSC Principles and Criteria if the pollock fishery's "management system" or "respect for domestic law" were assessed pursuant to the interpretations of those elements that the Objectors contend we should have used.
>
> The Assessment Team applied its best judgment to interpret individually each of the many standards included in the MSC's Principles and Criteria. No doubt we could have interpreted various parts of the Principles and Criteria, including, but by no means limited to, the provisions in dispute here, to have different meanings than those we chose. The Assessment Team repeatedly, and at length, considered alternative interpretations of the MSC's Principles and Criteria, including the interpretations urged by the Objectors. [This clearly speaks to the need for greater precision by the MSC in language used in the standards, the certification methodology, and any additional guidance documents provided to certifiers, clients, and stakeholders. This issue was raised by both the Bridgespan and Wildhavens reports that reviewed the MSC program, as well as follow-on letters to the MSC sent by concerned stakeholders in the environmental community.]

[592] MSC Principle 3 reads: "The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable." Fifteen individual criteria are specified for the "management system" and six additional criteria are set for "fishing operations." One of the terms at issue here, "respect for domestic law" is not, strictly speaking, a verbatim restatement of the MSC's own provision, though we consider it to mean the same thing. The term "respect for domestic law" was set and applied by the Assessment Team as scoring indicator 2.2.

Principle 3, in particular, presents any thoughtful reader (whether a participant in a fishery, marine resource conservationist, member of an assessment team, or expert serving on an MSC-convened objections panel) with numerous pieces of ambiguous text. The phrasing of the Principle and its criteria combine to create rich media for fertile minds. *Respect* for the law? *Effective* management? *Appropriate* to the size and scale of the fishery? Adding to the complexity, many individual criteria combine several concepts. Criterion 1, for example, appears to encompass at least a dozen different concepts or factors.

The Assessment Team anticipated that, had we simply set scoring indicators for each criterion as written for Principle 3, we would likely not be able to reveal clearly our reasoning because of the difficulty of explaining exactly how the individual factors were considered, how the factors related to each other, and how they were weighed. In order to help the Objectors and other readers understand the assessment, we elected to prepare a parallel set of criteria that, in our view, do a better job of describing (but do not bias, weaken or omit) the factors stated or implied by the Principle 3 criteria prescribed by the MSC (see Final Report). We believe that the way we "de-constructed" the relevant criteria made our analysis more transparent, lent even more substance and rigor to the assessment, and forced more details of the fishery to the surface for evaluation, discussion, and scoring. This is certainly true with regard to the issues of apparent greatest concern to the Objectors, namely, the characteristics of the fishery management system and the system's respect for applicable law, where we identified and assessed many individual components of "management systems" not described in the criteria, and tested the concept of "respect for law" through multiple factors.

The Objectors were never less than absolutely straightforward and professional in explaining their views. The potential implications of the Objectors' preferred interpretations were always clear and well documented in their report to the SCS Assessment Team as part of the stakeholder consultation. Yet even so, we took the precautionary step of requesting specific additional briefings from the Objectors on their high-priority issues, including the complex and important question of the fishery's compliance with domestic law.

The Objectors' comments on the Draft Assessment Report were also extensive and useful. We made substantial changes in the report between the draft and final stages to respond to those comments. The Team amended the draft report to address specifically the Objectors' critique of our interpretations of "management system" and "respect for law." We would have no objection whatsoever to providing the Objectors (or anyone else) with copies of the draft and final reports showing the revisions made on account of their comments.

Having considered all of the advocacy from the Objectors, and numerous thoughtful queries and probings from parties interested in the MSC certification process generally, we believe that our interpretations are the most appropriate in the circumstances of this fishery. We think the explanations of our reasoning, presented in the Draft and Final

Report and quoted at length by the Objectors, are transparent, complete and substantively responsive to the points raised by the Objectors throughout this proceeding.

In sum, we have never believed it appropriate for the Assessment Team to set or change its interpretations of the Principles and Criteria in order to achieve a particular result. We set indicators based on our understanding of the MSC provisions, sought and applied relevant evidence, and identified the results. It would be disingenuous to reverse that analytical sequence and we respectfully decline the opportunity urged upon us to do so now. "

Concluding Remarks

We do not believe that we have overlooked or dismissed any pertinent information that was placed in our hands. We do not believe we misinterpreted any information placed before us. We believe we adequately addressed and reported on all the issues raised by the conservation stakeholders during the assessment, during the report writing and review processes, and now in this response to their objection.

As we stated earlier in this document under general remarks, the fact that the Assessment Team and the Objectors disagree reveals the complex and controversial nature of this fishery, but it is not a sign of error by either party.

In concluding our response, we would also like to restate the fact that we fully understand the position the stakeholders find themselves in when dealing with government managed fisheries, and why they might continue to pursue an objection against the pollock fisheries. The conservation stakeholders are typically lacking the funding and the scientific expertise available to the government management agencies. As a result, the stakeholders are in a difficult position to argue their cases. On many occasions we were told that the management system was at a minimum dismissive and at a maximum disrespectful of stakeholders' views, especially when the stakeholders were tenacious about a subject where the management agency simply disagreed. In many cases it appeared to be due to the fact that the conservation stakeholders could not send in experts with credentials equal to those of the scientists managing the fishery. And this was confirmed by several NMFS staff. According to the stakeholders, one of the primary reasons they pursued remedies in federal court was that the industry and management authorities simply refused to take their points fully into consideration.

Since the completion of the assessments on the BSAI and GOA pollock fisheries, events have occurred that shed some light on why the conservation stakeholders stated these concerns – events that we as an assessment team find troubling and that will need to be looked at closely if any post-certification assessments of the pollock fishery should occur.

In the months since we finished the initial assessments, we sense that NMFS science has continued to improve and that better integration of ecosystem principles into harvest management remains an important priority for the management system. This is quite positive. However, we are much less confident that the passage of time reveals a positive trend for the management system with respect to those indicators that measure compliance with domestic law, honest self-evaluation, and accommodation of dissent or emergent viewpoints and opinions. The Team's particular skepticism regarding certain aspects of NMFS approach to management of the American public's natural resources was deepened upon learning that NMFS management has apparently decided to refuse to cooperate with future MSC-based fishery assessments because of the pollock Assessment Team's observations and conclusions presented in the GOA and BSAI assessment reports. The opinions of the assessment team are more difficult to dismiss as the scientists were of equal stature and expertise, and the legal expertise on the team superior to that found within NMFS.

Granting all possible respect for the individuals at the helm of NOAA and NMFS, and with complete sympathy for the difficulties and occasional indignities of public service employment, what does it say about the management system for this fishery that it responds to criticism by trying to evade further critiques?

To many it says a great deal certainly. This turn of events reaffirms observations made during the course of the assessment by the Objectors and many others. We all wish we could ignore issues when they are difficult or the calls don't go our way. The fact that NMFS is refusing further cooperation after receiving favorable assessments of its largest and perhaps most controversial fisheries--delivered in reports replete with praise for NMFS personnel, programs, and performance--is truly remarkable and does much to corroborate the most negative and cynical perspectives of NMFS management culture. More the pity, since most of the NMFS staff interviewed by the assessment team are extremely professional and dedicated civil servants, and do not profess indifference or disinterest in opinions that come from sources outside NMFS and outside normal channels of scientific inquiry and review.

This behavior, and other events that have happened since we completed the initial assessments, including the opening of fisheries in steller sea lion critical habitat, are properly concerns to be raised by stakeholders and must be looked at in any future surveillances or assessments of the pollock fisheries.

At present though, these are beyond the scope of the initial assessment and are not proper bases for objection proceedings.

Unit 4 Bakery Place
119 Altenburg Gardens
London
SW11 1JQ United Kingdom
Tel: +44 (0)20 7350 4000
Fax: +44 (0)20 7350 1231

18 November 2004

Dear All

Re: MSC Board of Trustees Decision – Gulf of Alaska Pollock Fishery Objections Panel

Following the submission of comments regarding the proposed members of the independent Objections Panel for the further objection on the Gulf of Alaska pollock fishery, the MSC Board of Trustees has considered the Panel's composition in detail.

The Board has taken into account the comments received from the parties in accordance with the MSC Objections Procedure and has decided that the Panel members will be:

- Dr Keith Sainsbury, MSC Trustee and Panel Chairman
- Dr John Caddy
- Mr Michael Lodge

We will advise you within the next few days about the schedule for the panel's deliberations.

With all good wishes,

Rupert Howes

RUPERT HOWES Chief Executive

REPORT OF THE MARINE STEWARDSHIP COUNCIL (MSC) OBJECTIONS PANEL ON THE GULF OF ALASKA POLLOCK FISHERY

MSC Objections Panel: Dr. Keith Sainsbury Dr. John Caddy Mr. Michael Lodge

12 February 2005

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REPORT OF THE MARINE STEWARDSHIP COUNCIL (MSC) OBJECTIONS PANEL ON THE GULF OF ALASKA POLLOCK FISHERY

1. INTRODUCTION

1.1 This Objections Panel has been convened pursuant to MSC objections procedures to consider an objection to a determination made by the independent certification body, Scientific Certification Systems Inc. (SCS) (referred to herein as "the Certification Body") to certify the Gulf of Alaska Pollock Fishery against the MSC Principles and Criteria for Sustainable Fishing. Details of the objections are set out below.

1.2 The certification process for the GOA Pollock Fishery commenced in 2001. In accordance with MSC certification procedures, a draft determination was issued by the Certification Body in November 2003. The final determination was issued on 2 July 2004. An initial objection to this determination was submitted on 4 August 2004 on behalf of three non-governmental organizations: Alaska Oceans Program, Greenpeace International and National Environmental Trust ("the Objectors"). The Certification Body responded to that objection on 24 September 2004. On 16 October 2004, the Objectors submitted a further objection to MSC, which duly considered the further objection and issued a decision on 22 October 2004. In its decision, MSC dismissed the further objection on all but two grounds, which are now referred to this Objections Panel for consideration.

Membership of Objections Panel

1.3 The Objections Panel was constituted by the MSC Board as follows: Dr Keith Sainsbury (an MSC Board member), Dr John Caddy and Mr Michael Lodge. Details of the qualifications and experience of the members of the Objections Panel appear in Annex I.

Conduct of deliberations

1.4 The Objections Panel conducted its deliberations by telephone and email during December 2004 and January 2005. The Panel did not consider it necessary to call on the Certification Body, the Objectors or the subject fishery to make oral representations; nor did any party request an oral hearing.

Scope of Objections Panel

1.5 The scope and powers of the Objections Panel are set out in the MSC Objections Procedure (dated 12 July 2004) and the MSC Terms of Reference for Objections Panels.[1] The intent of the objections procedure is to provide an orderly and structured process by which concerns about certain aspects of the assessment and the Certification Body's determination can be transparently addressed and resolved. The Objections Panel is not entitled to conduct a full reassessment of the fishery against the MSC Principles and Criteria; nor is the Objections Panel entitled to substitute its own views and opinions for that of the Certification Body. The purpose of the Objections Panel is solely to examine the claims made by the Objectors and determine whether the responses by the Certification Body to those claims are consistent with the MSC Principles and Criteria and the MSC process.

1.6 The Objections Panel may either allow the determination to stand or may remand the determination to the Certification Body with instructions to reconsider significant procedural issues or information omitted or inadequately considered. A determination may be remanded only on the grounds that it is arbitrary or unreasonable or that there has been a violation of MSC procedures and it is probable that the violation changed the outcome of the determination.

1.7 In accordance with well-established legal principles, we interpret this test as meaning that the Objections Panel is entitled first to investigate the action of the Certification Body with a view to seeing whether it has taken into account matters which it ought not to take into account, or,

[1] Terms of Reference for MSC Objections Panels (Version 2, July 2004), MSC.

conversely, has failed or refused to take into account or neglected to take into account matters which it ought to have taken into account. Even if that question can be answered in favour of the Certification Body, it may be still possible to say that it has nevertheless come to a conclusion so unreasonable that no reasonable certification body could ever have come to such a conclusion.

1.8 The MSC Procedures further require that the Objections Panel shall base its evaluation solely on the basis of the record submitted by the certification body, subject fishery and the objecting party. That is:

(a) the final determination by the certification body;
(b) the initial objection;
(c) the response to the initial objection;
(d) the further objection;
(e) any further input from the subject fishery that was made available to the certification body during the original assessment, provided that the subject fishery is not the objecting party.

1.9 The Panel may also seek external advice when deliberating.

1.10 In our deliberations we have considered the key source documents used by the Certification Body in its assessment, the Certification Body assessment report, the Certification Body response to the Objection, the key source documents used by the Objectors, and both the Objection and the Further Objection lodged by the Objectors. The source documents examined included:

(a) the North Pacific Fishery Management Council (NPFMC) Stock Assessment and Fishery Evaluation (SAFE) report for the groundfish resources of the Gulf of Alaska (2002 and 2003);

(b) the NPFMC SAFE report for Walleye Pollock in the Gulf of Alaska (2002 and 2003);

(c) "Decline of the Steller sea lion in Alaskan Waters – Untangling food webs and fishing nets", Report of the Committee on the Alaska Groundfish Fishery and Steller Sea Lions, National Research Council (2003), (hereinafter "the 2003 NRC Report"); and

(d) the Regulatory Assessment/Regulatory Impact Review, Proposed Amendment to the Regulations Implementing the Fishery Management Plan for Groundfish of the Gulf of Alaska;

1.11 In addition, we have drawn upon other information and reports relevant to the issues before us (referred to as necessary in this report) and have also briefly examined the 2004 NPFMC SAFE report for GOP pollock that was not available at the time of the Certification Body assessment and determination.

2. GROUNDS FOR OBJECTION

2.1 Objections to the Final Determination were filed on a number of grounds, which we do not need to set out in full here. The MSC Board decided to dismiss all the grounds of objection except for two. The reference to this Objections Panel relates only to the objections made on these following two grounds.

Low stock size of GOA pollock

2.2 The Objectors contend that the fishery should have failed its assessment against MSC Principle 1, Criterion 1, i.e. that 'the fishery shall be conducted at catch levels that continuously maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.' Specifically, the Objectors argue that the Certification Body should not have considered the fishery to pass the minimum Scoring Guidepost (60) under performance indicator 1.1.2.1, which requires that "stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent."

2.3 In the initial objection the Objectors asserted that the GOA pollock stock has been in continuous decline for over two decades. They also said that there is no question that the GOA pollock stock is significantly below MSY. The fishery should fail under performance indicator 1.1.2.1, the overall score for MSC Principle 1 should be lowered, and until the stock recovers, the fishery should not be certified. The Objectors questioned the reliance by the Certification Body on a particular interpretation (Dorn 2003 and Dorn, *et al.* 2003) of the limit reference point for stock size, the interpretation of which they also questioned. The Objectors also asserted that management has been unable to rebuild the stock, which continues to decline.

2.4 The Certification Body reviewed the Objectors' concerns, but found no reason to alter its determination. The Certification Body argued that the fishery apparently fails the benchmark because of the rules under which the stock assessment analysis was conducted, but that a separate analysis in the same assessment report accounts for the variable nature of the ecological system in which the stock is found. It stated that in its assessment of the fishery against the performance indicator, its team was mindful of its own statement of intent for the indicator, which, it asserts, the Objectors failed to take into consideration.

2.5 In answer to this response to the initial objection, the Further Objection states that "the SCS team recognized the low stock size … but scored the fishery too generously given the serious decline. The team justifies its high scoring on the notion that the low stock size is a natural fluctuation." The Objectors dispute the rationale and assumptions upon which the justification is based. The Objectors also question whether the management response is sufficiently precautionary and state that the team failed to attach conditions that require more precautionary actions.

2.6 In deciding to refer the matter to the Panel, the MSC Board noted that this is a complex set of arguments relating to the appropriate benchmark for fluctuating stocks. An important observation by the Certification Body in its response to the initial objection seemed particularly relevant to the Board: "which interpretation of B_{MSY} is the more appropriate for this stock?" No operational interpretation of the MSC standard exists to provide clarity on benchmarks for fluctuating stocks.

Catch inside Steller sea lion critical habitat

2.7 The second ground for objection questions whether, in the light of its findings in relation to the impacts of the GOA pollock fishery on Steller sea lions, the measures and conditions proposed by the Certification Body are sufficiently precautionary when measured against the standards set by MSC Principle 2.

2.8 In the initial objection, the Objectors stated that "despite the SCS team's concern about the ecosystem impacts of the GOA pollock fishery,… alarmingly low abundance level and declines of more than 80% in Steller sea lions in the last thirty years…, the Final Determination fails to include conditions that require precautionary action". The Objectors asserted that conditions under MSC Principle 2 do not go far enough to address serious concerns that the Certification Body's report reflected. They stated that conditions should require precautionary management actions such as

significantly reducing TAC levels or curtailing fishing in critical habitat and instituting pollock spawning reserves. Further that while the Certification Body's report recognized the issue, it failed to take the next step and require stringent conditions to ensure the certification meets the MSC standard.

2.9 The Certification Body's response to the initial objection stated that no new evidence was presented by the Objectors that current harvest rates from Steller sea lion critical habitat are causing significant impacts on Steller sea lions, nor do the Objectors claim that any such evidence exists. The Certification Body considered that instead the Objectors argued that in the absence of clear scientific evidence, a particular kind of precautionary approach should be adopted, i.e., those actions listed in the paragraph above. It was acknowledged that the "essence of the objection is what properly constitutes a precautionary approach." The Certification Body asserted that the balance of scientific opinion indicates that factors other than pollock fishing are likely to be the cause of Steller sea lion decline. It reiterated its conclusion that, after examining the evidence, the appropriate precautionary measures are to require additional research to determine whether the fishery impacts Steller sea lions, that the research should be carried out as a matter of urgency and that the management system will be required to be responsive to the research findings. The Certification Body took the view that it was not defensible to require "draconian constraints on the fishery just in the unlikely event that the experts may be wrong." Further, that any limits to fishing added as a further condition would be "arbitrary, unscientific and of unknown efficacy……impossible to justify any particular figure as a limit, except as a precautionary response to a concern that is based on feelings and not on objective underpinning science."

2.10 The Objectors in their further objection disagreed that the conditions they suggested are draconian and reaffirmed their belief that these actions are necessary responses to the identified problems facing Steller sea lions. The Objectors also assert that despite millions of dollars being spent, research has been unable to answer definitively the main questions regarding Steller sea lion declines and that research is not a panacea and scientific uncertainty about marine ecosystems will not be resolved by more research in many cases. The Objectors argue that the need for more information should not be used as an excuse to delay precautionary measures while research continues – scientific uncertainty about the effects of fishing on ecosystems is not a reason to delay environmental protection or ecosystem-based management, rather it is a reason to increase it. The Objectors invoke the Certification Body's own report where it states that "… on the limited understanding of functional relationships between pollock and other important components of the food web, the evaluation team would expect the harvest of pollock to be taken in a precautionary manner that ensured that impacts on the food web would be restrained." The Objectors further state that it is unfortunate that "the SCS team fails to hold the fishery to the very standard that it professes to recognize."

2.11 The MSC Board noted that the essence of this argument is about the interpretation and application of the precautionary approach, i.e., what is the most appropriate management response given the uncertainty surrounding the issues.

3. FIRST GROUND FOR OBJECTION: THE APPROPRIATE BENCHMARK FOR STOCK SIZE OF GOA POLLOCK

Background and issues for determination

3.1 The first ground for objection relates to the interpretation of MSC Principle 1, Criterion 1. That is "the fishery shall be conducted at catch levels that continuously maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity." The Certification Body identified 23 measurable indicators to provide an operational interpretation of this criterion. With the exception of indicator 1.1.2.1 these all focus on testing and improving the fishery assessment and harvest control rule. The harvest control rule is used to calculate the appropriate exploitation rate based on the estimated stock condition. It is intended to prevent both too high an exploitation rate (i.e. overfishing) and over-depletion of the stock (i.e. overfished stocks). Indicator 1.1.2.1 establishes a limit to the stock size, below which the stock is regarded as overfished and not certifiable by MSC. It is the Certification Body's identification and use of this limit that is challenged by the Objectors and that is reviewed here.

3.2 The Certification Body adopted the following statement of intent and Scoring Guideposts for assessing the performance of the GOA pollock fishery against indicator 1.1.2.1:

> *"The intent is to assess whether the stock is currently "overfished". There is no internationally agreed standard to define this. A recent FAO view (based on an interpretation of the UN Fish Stocks Agreement) is that target stocks should generally be maintained above B_{MSY}, which should be used as a limit reference point. An alternative (but not generally accepted) view is that explicit allowance should be made for predators by increasing target and limit levels well above B_{MSY} (e.g. the "CCAMLR" strategy). Stock levels can also fluctuate due to natural environmental variability, and this needs to be taken into account. In this regard, B_{MSY} is an equilibrium concept and is not easily defined for a naturally fluctuating stock. In the absence of precise or agreed definitions or standards, expert judgments will be made based on the following guideposts:*
>
> *100 Scoring Guidepost*
>
> > *Stock assessments show the stock to be above the reference biomass with greater than 90% probability.*
> > *The reference biomass is above B_{MSY} and takes into account the needs of predators.*
>
> *80 Scoring Guidepost*
>
> > *Stock assessments show the stock to be above the reference biomass with greater than 70% probability.*
> > *The reference biomass is B_{MSY} or its equivalent and takes into account the natural variability of the stock.*
>
> *60 Scoring Guidepost*
>
> > *Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent."*

The Certification Body awarded the fishery a score of 70 against this performance indicator and identified three specific conditions for continued MSC certification. These were:

> *"The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of pollock. Alternative harvest strategies*

(harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation.

The SCS (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the relative impacts of fishing on recruitment variability and stock abundance.

The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikov Strait, to better understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003)."

3.3 The Certification Body's interpretation of "B_{MSY} or its equivalent" accepted the now well established evidence for long term fluctuations in population size and productivity of pollock and other fishery resources of the North Pacific– fluctuations that broadly correlate with variations in the oceanographic environment of the North Pacific. The pollock population size was small but slowly increased between 1960 and 1975. There was relatively little fishing during this period and weak year-classes were recruited to the population during the 1960s. The population rapidly increased after 1975, reaching a peak in abundance between 1982 and 1985, following recruitment of several very strong year-classes during the 1970s and early 1980s. The fishery catch also increased during the late 1970s and early 1980s, reaching peak catches between 1982 and 1985. Since about 1985 the population has steadily decreased, with both recruitment strength and catches at intermediate levels relative to historical values. The GOA pollock spawning biomass in 2002 was similar to that during 1965-1975.

3.4 $B_{35\%}$ is used as a proxy for B_{MSY} in the pollock stock assessments and the harvest control rule used by the fishery regulators. $B_{35\%}$ is the long term average biomass that would be expected by applying a fishing mortality ($F_{35\%}$) that reduces the 'spawners per recruit' to 35% of the 'spawners per recruit' in the absence of fishing ($B_{100\%}$). The stock assessments estimate recruitment and biomass in the population each year by fitting a population model to research and commercial fishery data. $B_{35\%}$ and $B_{100\%}$ were then calculated as the product of the average recruitment between 1977 and 1999 and, respectively, the 'spawners per recruit' under $F_{35\%}$ and F=0. A single constant recruitment is used to represent average conditions and so this results in a single constant, $B_{35\%,}$ as a proxy for a single constant, $B_{MSY,}$ and similarly a single constant level of $B_{100\%}$ to act as a reference for depletion of the stock by fishing. These single constant values relate to the situation of constant recruitment equivalent to the average of the observed recruitment between 1977 and 1999 and so they relate to a period of relatively high pollock productivity. This results in the conclusion that the population was below the $B_{35\%}$ reference level for overfishing prior to about 1975, was above the reference level between about 1975 and 1998, and has been below the reference level since about 1998. Using the constant reference point for $B_{100\%}$ the pollock biomass was estimated to be about 24 – 28% of the unfished biomass in 2002 and about 27 – 31% in 2003; below the 35% limit implied by this constant average interpretation of $B_{35\%}$ and B_{MSY}.

3.5 This average or constant approach is a classical application of fishery reference points, and is the basis of the harvest control rule used by the fishery regulators in the GOA. However the Certification Body also considered an alternative method of calculating the effects of fishing on the stock that recognised that the productivity of the stock varied through time. The Certification Body used the population assessment models to calculate the biomass that would have been in the population each year in the absence of fishing ($_{unfished}B$). This is a dynamic approach to the reference points, with $_{unfished}B$ being a dynamic version of $B_{100\%}$. The estimated $_{unfished}B$ varies through time as productivity (e.g. recruitment) varies, and so does B_{MSY}. With this approach, and maintaining the intent and background logic of $B_{35\%}$, the surrogate for the dynamic interpretation of B_{MSY} is 35% of $_{unfished}B$ in any year. This is the interpretation of B_{MSY} and its surrogate that was used by the Certification Body in scoring the 60 Scoring Guidepost.

3.6 A potential problem with this dynamic approach to $_{unfished}B$ and B_{MSY} is that the recruitment strengths needed in the calculations are those that would have applied in the absence of fishing, and these can never be known definitively because the GOA population was fished. To address this potential problem the fishery assessment used a range of assumptions intended to encompass possible effects of fishing on recruitment. The range of assumptions included no fishing effect on

recruitment (i.e. the actual historical recruitments were used directly) and two different models of how recruitment might be affected by changed spawning stock abundance. All three recruitment assumptions gave very similar results (see Figures 31 to 41 and associated text in the 2003 NPFMC SAFE report). They all predict that in the absence of fishing the GOA pollock population (i.e. $_{unfished}B$) would have increased about tenfold between 1960 and the mid 1980s, then declined to about 40% of that peak abundance by 2002. And under this dynamic interpretation the fished population, as a percentage of the predicted unfished population, was estimated to have steadily decreased from 100% (i.e. no fishery depletion) in the early 1960s, to 40 – 46% in 2002. Under this dynamic interpretation, the population has not been reduced below 35% of $_{unfished}B$, the dynamic equivalent of the $B_{35\%}$ proxy for B_{MSY}, at any time in the history of the fishery. However under the combination of fishing and natural recruitment variability the population has been decreasing steadily since the mid 1980s. On this interpretation it is natural recruitment variation that has been responsible for much of the historical variability observed in population size, especially the low level population sizes prior to the early 1970s and the high population levels of the 1980s. The fishery has also had a significant effect and has caused the population in 2002 to be less than half (i.e. 40 – 46%) of what it would have been in the absence of fishing.

3.7 In awarding a score of 70 on this indicator the Certification Body considered both the constant and dynamic interpretations of B_{MSY} (i.e. $B_{35\%}$ and 35% of $_{unfished}B$) and measures of fishery-induced depletion of the pollock population. They concluded that for GOA pollock changes in productivity were such a significant feature of the population that the dynamic interpretation of B_{MSY} and fishery-induced depletion was the most appropriate one, and based their conclusions on this. The Certification Body also recognised that this dynamic interpretation of B_{MSY} would imply that a small sustainable yield was possible even when the population was at low abundance, which if taken would cause the population to be even lower than it would be in the absence of fishing. Although they considered that the ecosystem was presumably adapted to periods of low pollock abundance they also concluded that it was reasonable to have a minimum level below which it was undesirable to fall because of potential ecological impacts. They noted that the current GOA harvest strategy set this 'bottom line' at $B_{20\%}$ calculated using the constant recruitment methodology. This single constant value of $B_{20\%}$ provides a fixed minimum biomass below which catches would not be taken, even if such catches were in principle sustainable under the dynamic MSY interpretation. On the basis of this combination of considerations the Certification Body concluded that the stock passes the 60 Scoring Guidepost and arguably some elements of the 80 Guidepost. The Certification Body also considered that the population abundance, while not below the B_{MSY} reference level, was low and for this reason did not consider a score above 80 to be appropriate.

3.8 The Objectors raise several grounds for concern, most of which result from not accepting the dynamic interpretation of B_{MSY} and its proxy calculated as 35% of $_{unfished}B$. Specifically:

- That the abundance of the GOA pollock stock has been decreasing almost continuously for two decades, and that fishing has contributed to that decline and has perhaps been the major contributor. They do not agree that natural causes account for the decline.
- The Certification Body has not established a reference point other than B_{MSY}, whose proxy is $B_{35\%}$.
- The shifting baseline for B_{MSY} is likely more realistic but has not been used.
- The 2002 spawning biomass is below the $B_{35\%}$ level if that level is calculated as a constant based on recruitment between 1979 and 2002 (a different range of years than those used in the fishery assessments).
- The NPFMC fishery assessments, based on a constant interpretation of $B_{35\%}$, show that the spawning biomass has been below the $B_{35\%}$ level since 1999.
- The fishery should not be certified because of the low present stock size (below the constant interpretation of $B_{35\%}$).
- If the fishery is certified then conditions should be applied to reduce TAC levels, to create protected spawning reserves, and to prohibit fishing if $B_{20\%}$ is reached. In relation to prohibiting fishing below $B_{20\%}$ the Objectors suggest that while this condition is currently in the Fishery Management Plan it is *ad hoc* and could be changed in future.

3.9 There are three main questions we need to consider

(1) Is B_{MSY}, and the non-equilibrium shifting baseline interpretation of it and its proxy, an appropriate interpretation of the MSC Principle and relevant Criterion for use in setting the performance indicator and scoring guideposts?
(2) Is the score actually assigned to performance indicator 1.1.2.1. (i.e. 70) a reasonable reflection of the situation based on the information available? This includes the evidence for a prolonged decline in stock abundance in the past 20 years.
(3) Are the conditions for continued certification adequate?

Panel consideration

3.10 Our consideration of each of the three questions raised by the first ground for objection are set out below.

Question (1): Is B_{MSY}, and the interpretation of it that was used, an appropriate interpretation of the MSC Principle and Criterion for use in the Scoring Guideposts?

3.11 Current fisheries practice suggests that B_{MSY} is a suitable limit reference point for biomass.

3.12 There is no internationally agreed standard or guidance on limit reference points for biomass. However use of B_{MSY} is not inconsistent with the widely accepted use of F_{MSY} as a limit reference point for fishing mortality, although it is recognised that these are different reference points and that a low chance of exceeding F_{MSY} does not necessarily result in a low chance of dropping below B_{MSY}. Fishery-specific circumstances still need to be considered in choosing a biomass limit reference point, but in the case of GOA pollock the Certification Body's use of this reference point is in our view well justified.

3.13 The use of $B_{35\%}$ as a proxy for B_{MSY} (both as constant or dynamic interpretations) is well established and justified in the GOA pollock fishery assessment literature (i.e. SAFE and associated reports), and we agree with the Certification Body's decision to use this proxy. The Panel also recognised that the conditions for continued certification set by the Certification Body under Principle 1, performance indicators 1.1.1.5. and 1.1.2.1. will provide opportunities for further review and formal testing of the adequacy of the $B_{35\%}$ as a proxy for B_{MSY} in this fishery.

3.14 The Panel considered at length the constant and dynamic interpretations of B_{MSY} , and the constant and dynamic interpretations of its proxy $B_{35\%}$ and 35% of $_{unfished}B$ respectively. There is little doubt that the ecosystem of the north Pacific, including the GOA Pollock and its predators, is subject to periodic changes in environmental forcing as well as the effects of fishing. (see Annex II for a discussion of this). For pollock assessment as for other stocks in the region with significant natural variability, this poses a serious problem of interpretation and is somewhat inconsistent with the common view of sustainability as a situation of stable catch or stock size. (This is the view that is apparent in the preamble on sustainability in the MSC Principles and Criteria, which refers to a sustainable fishery as capable of being "continued indefinitely at a reasonable level"). The classical concept of MSY is an equilibrium concept, and so B_{MSY}, F_{MSY} and related reference points derived from this classical interpretation are also equilibrium concepts. But constant equilibrium reference points are of limited value where stocks are subject to significant natural variability on productivity – and particularly where long-term 'regime shifts' occur.

3.15 We find the dynamic approach to B_{MSY}, and the dynamic equivalent of its proxy, taken by the Certification Body to be innovative and appropriate to the situation. This dynamic interpretation provides an intuitively reasonable approach and shows a progressively greater impact of the fishery on the stock through the history of the fishery. The weaknesses of the dynamic approach to B_{MSY} and its proxy are recognised by the Certification Body and reasonably addressed. In particular:

(a) The possibility that different treatments of the effects of fishing on recruitment could lead to very different interpretations of the relative effects of fishing and the environment was examined by the Certification Body. We agree that a wide range of different treatments all gave very similar interpretations.

(b) The possibility that the dynamic interpretation of B_{MSY} and its proxy could result in very low biomass levels during prolonged periods of low productivity was explicitly considered by the

Certification Body. It concluded that reasonable protection was provided by stopping fishing if the biomass was below the constant interpretation of $B_{20\%}$ (using the average recruitment 1977 – 1999). We agree that conservation needs must intensify at low stock abundance, including periods of naturally low abundance to meet the needs of population and ecosystem continuity. For this reason we agree that additional restrictions on use of the dynamic interpretation of B_{MSY} its proxy are appropriate at low stock sizes. We agree with both the Certification Body and the Objectors that a cessation of fishing if the biomass falls below the constant interpretation of $B_{20\%}$ is a reasonable additional constraint on the dynamic interpretation of B_{MSY} in the context of the GOA pollock fishery.

3.16 In summary the Panel accepts that the dynamic interpretation of B_{MSY} (i.e. 35% of the dynamically calculated $_{unfished}B$ each year), combined with the additional constraint that the stock biomass should be above the constant interpretation of $B_{20\%}$, provide a realistic and reasonable limit reference point for GOA pollock. And the Panel agrees that this combination provides a reasonable interpretation of the 60 Scoring Guidepost requirement that “the reference biomass is B_{MSY} or its equivalent, and takes into account the natural variability of the stock”. However the Panel noted that in its assessment report the Certification Body did not provide a single and succinct statement of the dual condition that comprises the 60 Scoring Guidepost, although its intent and interpretation was clear in the discussion and justification of the score it gave. The lack of a single and succinct statement of the 60 Guidepost could cause misunderstanding. The lack of clarity that the Guidepost requires the stock to be above the static interpretation of $B_{20\%}$ for continued certification appears to have been one element in the concerns of the Objectors.

3.17 The Panel noted that the indicator of stock depletion using the dynamic interpretation (i.e. current biomass divided by $_{unfished}B$ each year) shows that fishery depletion of the stock increased from 65% to 44% between 1995 and 2002, the last year for which these calculations have been reported. If depletion continues at that rate it will breach the dynamic limit of 35% $_{unfished}B$, and possibly also the constant $B_{20\%}$ limit, within a few years. Further decrease in pollock productivity over the next approximately ten years is also expected by some scientists on the basis of some hypotheses linking pollock productivity and oceanographic fluctuations (see Annex II), which if borne out will also contribute to downward trends in the pollock population toward and possibly below the 60 Scoring Guidepost. The panel noted that the current management arrangements anticipate a cessation of pollock fishing if the stock drops below the constant $B_{20\%}$ level. In any event continued MSC Certification requires that the fishery continues to score above the 60 Scoring Guidepost.

Question (2): Is the score assigned to this performance indicator (70) a reasonable reflection of the situation and information available?

3.18 Subject to the qualifications given in the paragraph 3.17, the Panel found the score given by the Certification Body to be reasonable. The Panel accepts the dynamic interpretation of B_{MSY} (i.e. 35% of the dynamically calculated $_{unfished}B$), with the additional constraint of no fishing below the constant interpretation of $B_{20\%}$, as being a realistic and reasonable 60 Scoring Guidepost for GOA pollock. Under this interpretation the GOA pollock stock passes the 60 Scoring Guidepost.

3.19 The dynamic B_{MSY} interpretation and the current GOA pollock stock condition also seems to meet one of the requirements of the 80 Scoring Guideposts – i.e. that the reference biomass, B_{MSY} or its equivalent, takes into account the natural variability of the stock. A case was not made with regard to the other 80 Guidepost requirement however – i.e. that the stock is above the reference biomass with greater than 70% probability. From our reading of the 2002 NPFMC fishery assessment this case could perhaps have been made successfully. However the Certification Body did not score this indicator at 80 or more because of concern that the population was approaching the lowest biomass level ever recorded. We agree that a score of 80 or more is not justified.

3.20 The Panel accepts the interpretation that natural variability in productivity has been responsible for most of the decline in absolute abundance of GOA pollock since the mid 1980s, but that by 2002 the fishery had caused stock size to be somewhat less than 50% of what it would have been in the absence of fishing. This level of fishery-induced reduction is within the limit set by B_{MSY} for GOA pollock. So the fact of a continuous decline in GOA pollock from the mid 1980s to 2002 is not considered by the Panel to be grounds for scoring the fishery below 60 at the present time. However the Panel re-emphasises that under MSC procedures a score lower than 60 would result in loss of certification, and that would happen if the stock biomass dropped below either 35% of $_{unfished}B$

(dynamic interpretation or $B_{20\%}$ (static interpretation). In this connection we reiterate that there is a particular urgency for conservation of a periodically fluctuating stock as it approaches the low point in its production 'cycle', and there are reasons to expect that a low point in pollock production might occur between 2010 and 2020 (see Annex II). At that time the top priority should be to ensure an adequate spawning stock survives until a more favourable environment returns. The proposed cessation of fishing if the stock drops below $B_{20\%}$ (static interpretation) in the present fishery management arrangements and inclusion of that same limit in the 60 Scoring Guidepost provides a reasonable response to the circumstance and provides an incentive to avoid stock depletion of that magnitude.

Question (3): Are the conditions for continued certification adequate?

3.21 The three conditions for continued certification that were identified for performance indicator 1.1.2.1., and the related condition for performance indicator 1.1.1.5., are sensible and reasonable steps to support improved understanding and application of these indicators during the period of certification. The conditions are aimed at testing the harvest strategy, assessment methods and reference points to ensure that they perform as intended. The Panel supports these conditions.

3.22 However the Panel discussed at length the adequacy of these conditions for continued certification. In particular, the Panel shared the concern of the Objectors that the constant $B_{20\%}$ limit to fishing, which was core to the Certification Body's interpretation of the Scoring Guideposts, in combination with the dynamic interpretation of B_{MSY}, was not sufficiently clearly articulated in the conditions.

3.23 The Panel also was concerned about the lack of a well articulated recovery plan in the event that the stock closely approaches the dynamic B_{MSY} or constant $B_{20\%}$ limits. The catch control rule in the present harvest strategy provides some reduction in exploitation rate as the population decreases, but it is not clear that this is sufficient to avoid the limits set by the 60 Scoring Guidepost and the present fishery management arrangements. The Panel considered specific conditions that might be used to address this point. But the Panel ultimately concluded that the overall package of conditions already identified by the Certification Body, which were designed to further test and refine the harvesting strategy, are adequate for the present. Ongoing audits of the fishery and the results of the tests required as conditions of certification, will give the Certification Body the ability to respond to changed circumstances – such as deteriorating stock condition or lack of progress on appropriately refining the harvest strategy.

Objection Panel Decision for Issue 1

3.24 Notwithstanding our findings that the justifications, interpretations and conclusions made by the Certification Body in relation to the 60 Scoring Guidepost are reasonable, we do consider that the Certification Body erred in failing to give sufficient clarity in its statement of the 60 Scoring Guidepost. Specifically, we consider that the Certification Body should have made it clear that the 60 Scoring Guidepost requires that the biomass be both greater than the dynamic interpretation of B_{MSY} and greater than the static interpretation of $B_{20\%}$. This is a material error in the determination not only because specification of the relevant guideposts is required by the MSC Fishery Certification Methodology, but also because lack of clarity could result in unnecessary ambiguity in future audits. We have therefore decided to remand the determination to the Certification Body only for the purpose of providing greater clarity in the specification of the 60 Scoring Guidepost.

4. SECOND GROUND FOR OBJECTION: THE INTERPRETATION AND APPLICATION OF THE PRECAUTIONARY APPROACH AND THE APPROPRIATE MANAGEMENT RESPONSE TO POLLOCK CATCHES IN STELLER SEA LION CRITICAL HABITAT.

Background and issues for determination

4.1 The first ground for objection related to the correct interpretation of a specific performance indicator that reflected an MSC Criterion. In contrast, given uncertain information, the second ground for objection raises broad questions about the appropriate interpretation of and management response to the impact of pollock stock condition on endangered Steller sea lions. The finding of the Certification Body was that the management system has kept the impact of the fishery on a protected, threatened or endangered species within agreed and reasonable bounds. The key issue under the second ground of objection, however, is whether the measures and conditions proposed by the Certification Body are sufficiently precautionary in relation to the impacts of the pollock fishery on Steller Sea Lions when measured against the standards set by MSC Principle 2.

4.2 This requires consideration of the findings of, and measures proposed by, the Certification Body and consideration of the interpretation to be given to the precautionary approach in the context of MSC Principle 2.

4.3 MSC Principle 2 provides that:

> *Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.*

Reference to the precautionary approach appears in Criterion 3 of MSC Principle 2. In a passage that is worded in almost identical terms to Criterion 2 of MSC Principle 1 (which deals with the target species of the fishery) it provides that:

> *Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields*.

4.4 The wording of the relevant Criteria in Principles 1 and 2 are almost identical and both are focused on exploited populations. However, Principle 2, is aimed at "maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species)". The use of precaution specified in Criterion 3 of Principle 2 has a strangely narrow focus on depleted populations but the stated intent of Principle 2 is to encourage "the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem". The Certification Body interpreted Criterion 3 of Principle 2 as addressing the question of whether populations of animals that have been reduced in abundance by past actions of the fishery are now being enabled to recover through alterations in the management of the fishery. The reference in Criterion 3 to 'exploited populations' was taken to mean 'impacted populations of species other than the fishery target species', on the basis that MSC Principle 2 is directed at ecosystem management. We find this to be a reasonable interpretation of the criterion in the context in which it appears. We also consider that the level of depletion in this context is correctly taken to mean depletion that is not consistent with maintaining the structure, productivity, function and diversity of the ecosystem (including impacts on critical habitats and associated dependent and ecologically-related species). The requirement then is to ensure that a well-defined and effective strategy is in place to restrain the fishery so as to permit recovery and rebuilding of populations that have been depleted by the fishery. This would also include preventing the depletion of populations in future if they had not already been depleted. This was the approach taken by the Certification Body and we find it to be a reasonable one.

4.5 Management measures to protect Steller sea lions include monitoring, limiting direct mortality, and establishing specific operational conditions for the fishery in identified Steller sea lion critical

habitat (SSLCH). SSLCH has been defined as 20 nautical miles around all major haul-outs and rookeries and three large offshore foraging areas. The fishery conditions that apply inside SSLCH vary and can be altered through the fishery management decision processes. The conditions that apply involve excluding pollock fishing within 3 nautical miles of rookeries, excluding pollock fishing within 10 or 20 nautical miles of selected haul-outs and rookeries, excluding or restricting pollock fishing within the three offshore foraging areas, and constraining the seasonal timing of the pollock catch. These measures are designed to protect sea lions from disturbance and to protect sea lion prey resources inside SSLCH.

4.6 The Certification Body noted correctly that the definition of SSLCH is based on very limited information about the amount and type of foraging done inside and outside designated SSLCH, including the different areas within designated SSLCH that are subjected to different fishery restrictions. There is considerable uncertainty whether the designated SSLCH and the different fishery management measures within SSLCH are appropriate or adequate to provide the intended protection. The Certification Body also noted that despite the constraints on fishing in designated SSLCH, a large quantity of the GOA pollock catch is taken from these areas: about 55% of the total GOA catch was taken from designated SSLCH in 2002. This proportion has not greatly changed since 1990 when the Steller sea lion was listed as endangered and fishery controls in SSLCH were introduced. The Certification Body considered that this raised uncertainty about the effectiveness of the management measures in preventing localized depletion of pollock and other potential prey of sea lions inside designated SSLCH, and that in the absence of direct evidence to the contrary, uncertainty remained as to whether the fishery was indirectly impacting the Steller sea lion population growth rate.

4.7 The GOA fishery received a relatively high score – between 75 and 80 – on the performance indicators relating to MSC Principle 2 and the Certification Body recognised that the GOA pollock fishery provides “world’s best practice” in most aspects of MSC Principle 2. A great deal is known and monitored about the ecosystem and the ecological impacts of the fishery and this information is well communicated and utilized in management decision-making.[2] This includes information showing that the direct impact of fishing on Steller sea lions is known and low compared to its population size. Repeatedly, however, the Certification Body’s score for these indicators was reduced from what it would otherwise have been by the existence of a common set of concerns relating to the possible indirect impacts of the pollock fishery on the Steller sea lion and the other ‘top predators’ in the ecosystem. Specifically these concerns included:

(a) The high and unchanging proportion of the catch from SSLCH, indicating the possibility that management measures within SSLCH were not effective in reducing fishery impacts there, and that this had the potential to cause localized depletion of Steller sea lion prey. Under the circumstances the Certification Body regarded this as not representing a precautionary approach to management.

(b) The weak scientific basis for the definition of SSLCH and the subdivisions of the nominated SSLCH within which different management measures are applied.

(c) The very weak understanding of the effect of localized fishing on Steller sea lion population growth rate and foraging success, despite this having been an issue for a considerable period of time. The Certification Body repeatedly described this as effectively unknown.

(d) Poor monitoring and evaluation of previous fishery closures, especially in SSLCH, from which the effectiveness of these management measures and the effect of local fishing on sea lions and their prey could be examined.

4.8 In essence, the findings of the Certification Body were that in the absence of a better understanding of the effects of the fishery on Steller Sea Lions, a more precautionary approach to constraining harvest from critical habitats would appear warranted. It also found that management is

[2] The most thorough and authoritative review of the evidence and interpretations is that conducted in 2003 by the National Research Council of the U.S. National Academy of Sciences. This review identified eight major hypotheses to explain the sea lion decline, while recognising that a combination of these was also possible, and used the available data and understanding to assess the credibility of each. Among other things they conclude that that “no hypothesis can be excluded based on existing data” and that food and foraging related hypotheses are unlikely to represent the primary threat to recovery.

not taking a systematic approach to being precautionary, notwithstanding the specific protection measures taken pursuant to the U.S. Endangered Species Act.

4.9 In the light of these findings a number of conditions were specified for continued certification. All of these conditions involve research and analysis, and one would involve modification and monitoring of the fishery management arrangements in SSLCH starting no later than 2006. The conditions include:

(a) Requirements aimed at improving specific research projects, analysis and reporting (Principle 2, Indicators 1.2.1., 1.3.3., 2.1. and 2.2.1.).

(b) Use of existing information available in the ecosystem considerations chapter of the NPFMC stock assessment and fishery evaluation reports to bring ecosystem considerations into limit-setting of an Acceptable Biological Catch. (Principle 2, Indicator 1.1).

(c) A requirement to design and undertake, by 2006, experiment(s) to directly test and measure the effect of the fishery on Steller sea lions (Principle 2, Indicators 2.3.1 and 2.3.3). In setting this condition, the Certification Body was taking up and elaborating one of the recommendations in the 2003 NRC report. The condition is stated as follows

> "To improve the deficiencies in performance for this indicator, the fishery must design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on SSL behaviour, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2003) recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. We support the goals and objectives of the NRC's prescribed action, but appreciate that it would be inappropriate to suggest increasing pollock fishing intensity to levels that increase jeopardy (in the legal sense) to SSL populations and that there are complex scientific and legal issues involved. Therefore, it will be necessary to design this experiment in such a way that comparison can be made between areas where fishing intensity is reduced with areas where it is maintained at levels comparable to those in the recent past (but perhaps within this limit still increased by as much as the decrease in harvest lost to industry from reduced fishing areas). The hypothesis to test would then be that SSL numbers or productivity in reduced fishing areas would show a positive deviation relative to values in fished areas, and the null hypothesis that performance of SSL would be no different between areas. Such an experiment should be underway no later than 2006."

4.10 There is common ground between the Certification Body and the Objectors that current management measures in SSLCH are not sufficiently precautionary in some respects. The Objectors assert that the further conditions set out above do not go far enough to address the serious concerns that the Certification Body's report reflected. They propose that conditions should require additional precautionary management actions such as significantly reducing TAC levels or curtailing fishing in critical habitat and instituting pollock spawning reserves. In the Further Objection, it is argued that research is not a panacea and scientific uncertainty about marine ecosystems will not be resolved by more research in many cases. The Objectors argue that the need for more information should not be used as an excuse to delay precautionary measures while research continues – scientific uncertainty about the effects of fishing on ecosystems is not a reason to delay environmental protection or ecosystem-based management, rather it is a reason to increase it. They consider that the Certification Body has not required sufficiently precautionary actions, and particularly actions on the water, to immediately modify fishing so as to avoid potential risk.

Panel Consideration

4.11 Against this background, the real issue for our consideration is not whether the situation warrants the application of a precautionary approach, but whether the conditions applied to the fishery as a condition of certification are consistent with the precautionary approach as that term is used in the context of MSC Principle 2.

The precautionary approach

4.12 The MSC Principles and Criteria contain three references to the precautionary approach, one relating to each of the three Principles. The intent is presumably to require that the precautionary approach be applied during consideration of the target species, the broader ecosystem and the fishery management system.

4.13 In the context of fisheries management, the precautionary approach is really an application of the precautionary principle. It stems from Principle 15 of the Rio Declaration,[3] which states that:

> *In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.*

4.14 Rio Principle 15 is a statement of general principle. By itself it simply states the general proposition that lack of full scientific certainty should not be used as an excuse for postponing regulatory action; the point being that it is virtually impossible to have full scientific certainty, particularly with respect to complex ecological processes. Practical formulations of the precautionary approach (for example, in legislation) vary widely across existing precedents. The particular formulation used can render the principle weaker or stronger as a tool for environmental protection; an apparently small difference in wording may have large implications for the parties subscribing to the principle. The degree of (pre)caution to be exercised in any particular circumstance is usually related in some way to the degree of risk of some threshold of harm or actual damage occurring should precautionary measures not be applied to prevent that harm or damage from taking place. Risk is a product both of the probability of occurrence of an event and of the magnitude of the impact of such an event were it to occur. Thus an unlikely event with a high impact would potentially pose the same risk of harm to the environment as a likely event with a low impact. Management of environmental risk includes deciding whether the risk must be reduced, if so how this may be achieved, and whether the action should be aimed at reducing the probability of occurrence, or focused on reducing the magnitude of its impact.

4.15 A key component of the precautionary approach to fisheries management is that the decision-maker should not use the existence of scientific uncertainty to justify lack of action. Action taken under the precautionary principle is a type of preventative measure. However, it is the existence of scientific uncertainty that renders any such action “precautionary” rather than simply “preventative”. Such uncertainty may take several forms, principally a lack of data, or a lack of understanding of the processes and interactions between species in the ecosystem. Probably the second of these components is the more important with respect to the relationship between Steller sea lions and GOA pollock.

4.16 The particular invocation of the precautionary approach used by the MSC in relation to Principle 2 is quite specific, although it is also to some extent ambiguous. The precautionary approach is to be invoked whenever “exploited populations are depleted.” Its specificity implies an objective finding (with no room for uncertainty) that the stock is depleted, although not necessarily depleted by fishing. This is not necessarily consistent with the way in which the precautionary approach is described in Rio Principle 15 where “lack of full scientific certainty” as to either cause or effect is not to be treated as an impediment to regulatory action. Under Rio Principle 15, and in many other precedents,[4] precautionary measures would need to be applied where there are “threats of serious or irreversible damage,” rather than when the situation to be prevented has already arisen and the stock is depleted. This difference in the threshold is not particularly relevant to the GOA pollock situation,

[3] UN Conference on Environment and Development, Rio de Janeiro, 3 – 14 June 1991, Vol. I: Resolution adopted by the Conference, resolution I, Annex I.

[4] For example, according to the European Commission Communication on the precautionary principle (issued in 2000) if there is no evidence that something is harmful, but there are 'reasonable grounds for concern' that it might be, then experimentation should not proceed. The Communication states: “Whether or not to invoke the precautionary principle is a decision exercised where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment, or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection.”

where all parties are agreed that the Steller sea lion population is already depleted, although the implications of such a strict test may cause difficulties in other contexts. We would simply note here that a formulation such as "indications through preliminary objective scientific evaluation that the stock is depleted … " is considerably more precautionary than "where the stock is depleted." The broader problem with the MSC formulation is that, although it clearly defines a very high threshold of harm at which precautionary action is to be taken (i.e. "where exploited populations are depleted"), it provides little guidance as to the nature of the regulatory action that is required to give effect to the precautionary approach. Two readings are possible. On one reading, "where the stock is depleted … the fishery will be executed … consistent with the precautionary approach …" (i.e. action aimed at reducing the magnitude of the impact of the harm to be avoided). Adopting a different interpretation, it could be argued that it is the "recovery and rebuilding" of the stock that is to be permitted to occur to a level and at a rate consistent with the precautionary approach, thus implying that the objective is stock recovery to a level commensurate with precautionary management (i.e. action aimed at reducing the future probability of occurrence of the harm to be avoided).

4.17 In looking for guidance as to how the precautionary approach should be applied under MSC Principle 2, it is logical to examine how the precautionary approach has been applied in a number of international fisheries instruments, including the FAO Code of Conduct and the 1995 UN Fish Stocks Agreement. As expressed in the Code of Conduct, and elaborated in FAO Technical Guidelines (FAO 1996), the application of the precautionary approach requires the establishment of target and limit reference points (on the basis of the best available scientific evidence) and the action to be taken if reference points are exceeded. It also requires that uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species as well as environmental and socio-economic conditions, be taken into account. The Code provides:

> ***7.5 Precautionary approach***
> *7.5.1 States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.*
>
> *7.5.2 In implementing the precautionary approach, States should take into account, <u>inter alia</u>, uncertainties relating to the size and productivity of the stocks, reference points, stock condition in relation to such reference points, levels and distribution of fishing mortality and the impact of fishing activities, including discards, on non-target and associated or dependent species as well as environmental and socio-economic conditions.*
>
> *7.5.3 States and subregional or regional fisheries management organizations and arrangements should, on the basis of the best scientific evidence available, <u>inter alia</u>, determine:*
>
> *(a) stock specific target reference points, and, at the same time, the action to be taken if they are exceeded; and*
>
> *(b) stock specific limit reference points and, at the same time, the action to be taken if they are exceeded; when a limit reference point is approached, measures should be taken to ensure that it will not be exceeded.*

4.18 A similar approach is taken by the UN Fish Stocks Agreement, article 6(3)(b) of which requires that States "in implementing the precautionary approach" are to "apply the Guidelines set out in Annex II of the Agreement and determine, on the basis of the best scientific information available, stock-specific reference points and the action to be taken if they are exceeded". Annex II of the Agreement provides Guidelines for the application of "precautionary reference points". While those Guidelines are mostly worded with a focus on target species the following elements of Annex II of the Fish Stocks Agreement are particularly relevant to application to non-target species:

Management strategies shall seek to maintain or restore populations of harvested stocks, and where necessary associated or dependent species, at levels consistent with previously agreed precautionary reference points.

Fishery management strategies shall ensure that the risk of exceeding limit reference points is very low. If a stock falls below a limit reference point, or is at risk of falling below such a reference point, conservation and management action should be initiated to facilitate stock recovery.

4.19 The wording of Annex II of the UN Fish Stocks Agreement is particularly useful because it establishes a clear link with the need to conduct the fishery as a whole at levels consistent with previously agreed precautionary reference points. Overall we understand the intention of MSC Principle 2 and its associated Criteria as an attempt to apply the precautionary approach to recovery of elements of the ecosystem that have been depleted by fishing, or risk being so depleted, to an extent that is not consistent with maintaining the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species). We note that such an interpretation of MSC Principle 2 necessarily implies that there be some causal link between fishing of the target stock and the associated or dependent species (although clearly that link need not be the only or even the most proximate cause of depletion). The risk, in the present case, is further depletion or non-recovery of the already depleted Steller sea lion stock. Clearly, the risk is non-negligible, even though we note (as did the Certification Body) that of the various hypotheses advanced for the decline of the stock by the NRC, the risk of fishing alone causing further stock depletion is relatively low. In the absence of any specific guidance in the MSC Criteria our understanding is that regulatory action should be consistent with that proposed in the operational statement of the precautionary approach to fisheries in the FAO Code of Conduct and elaborated in the FAO Technical Guidelines. This strongly suggests to the Panel that a precautionary response would imply, as well as appropriate regulatory action, the establishment of precautionary reference points for the target species such as would have the effect of reducing the magnitude of the present stock depletion and reducing the likelihood of further depletion. The question is to determine a "proportionality of response" to ensure that "the selected degree of restraint is not unduly costly." [5]

4.20 We have considered the question of the appropriate reference point for the fishery in connection with Issue 1. What we did not specifically consider in light of our findings on Issue 1 is the way in which the precautionary approach might properly be applied in situations where productivity is subject to changes in environmental regime. The proper application of the precautionary approach is one of the objectives of the MSC approach to resource certification, but the reality that productivity for some resources is subject to changes in environmental regime, is only becoming evident as time series of the level of fisheries production exceed a half century or so. Hence the precautionary approach is required if regime-linked resources are to continue to be productive into the future. Evidence in the North Pacific from longer histories of fisheries production for some species, is that biomass and landings have been linked to the prevailing environmental regimes (a selection of evidence from the literature that supports this point of view is given in Annex II). Physical evidence from much longer environmental series revealed through ice cores and other records also confirm a scenario of past environmental fluctuations over a time frame exceeding a thousand years or more. Such environmental scenarios are apparently common to the global oceans, and to northern hemisphere environments in particular. This basic scenario has not been specifically taken into account in deciding on a precautionary approach to managing northern Pacific fishery resources, even though the FAO Code of Conduct for Responsible Fisheries states that management measures should respond to declines in abundance, irrespective of whether these are caused by overfishing or natural declines in productivity.

4.21 Some suggested considerations for a precautionary approach that takes this scenario into account are suggested as follows.

(a) If consistent declines are occurring in fisheries productivity despite low levels of exploitation, and these can be linked to poor environmental conditions whether ambient temperature

[5] James Cameron and Tim O'Riordan (eds.) *Interpreting the Precautionary Principle*, Earthscan Publications, 1994.

or a change in current regimes leading to poor recruitment, it may be supposed that a regime change is underway. This situation should be taken into account in deciding on harvesting policy.

(b) If there is evidence from the same species in adjacent stocks with a longer history of exploitation, or species related to the target species in the local food web which show evidence of quasi-cyclic production in the past, this suggests that regime changes affect production. If so, the following considerations should be given due weight in the management framework:

- Recognize that the natural low point in resource abundance, even in the absence of fishing, constitutes a period of stress for the target species and for other species dependent on it in partly or wholly for their trophic requirements.
- This situation may be recognized by a consistent reduction in recruitment over time, a decline in stock distribution area, and/or a change in age composition of survivors showing that recruitment is not occurring at the same level as in the past
- If resource productivity continues to decline despite a reduction of the exploitation rate to below that due to natural causes such as predation, it is important to ensure that a lower limit to biomass be decided upon. If there is a high probability that this has been reached, a moratorium on fishing or equivalent emergency measure protecting the source population should be applied.
- This last-mentioned measure has the objective of ensuring that the spawning potential of the resource remains adequate to avoid depensatory effects, and ensures that stock rebuilding will be possible when environmental conditions improve.
- Management measures during the nadir in the production cycle should allow for the dietary requirements of dependent and charismatic species, or those that are of particular ecological importance, and will depend on protection of source populations of the target species.
- As it becomes evident that a consistent decline in abundance is occurring despite significant constraints on fishing exploitation, a recovery plan should be agreed upon with stakeholders, and introduced into the fisheries legislation in advance.

(c) With respect to the reference points to be applied to resources subject to regime shifts, while these should be similar in form and objective to those for more ‘stable’ resources, the management framework should incorporate tiered provisions for management that reflect the current status of the resource, such that management provisions are more stringent as the resource approaches its nadir.

(d) The application of reference points for biomass in the control rule may be adjusted to take into the current level of productivity as measured by recruitment trends, and should vary with resource productivity. However, there will be a risk in allowing a constant proportion of the biomass to be harvested throughout the production cycle. It would be preferable to set a minimum biomass level as a fraction of the overall average productivity, below which a moratorium on fishing should be introduced.

Application of the precautionary approach to the GOA pollock fishery

4.22 We consider that the Certification Body reasonably interpreted the precautionary approach in its assessment of the fishery (including Principle 2). Overall the approach taken by the Certification Body is consistent with our interpretation of the precautionary approach as expressed in the MSC Principles and Criteria. Where the Certification Body has taken note of areas where the precautionary approach was not being applied, they clearly and explicitly considered the uncertainty and risks involved in making their scoring judgements. We consider these judgements to have been reasonable and consistent with the precautionary approach. For example the tier-based assessment methodology used in the fishery is an example of the requirements set out by section 7.5.2 of the FAO Code of Conduct. Yet the Certification Body determined that the ABC methodology does not sufficiently incorporate ecosystem considerations to be considered precautionary. In particular, the methodology does not reflect the uncertainty about the impact of the fishery on the stock, and especially the impact of the fishery inside SSLCH (See Final Determination, pages 110 – 112). Accordingly, measures were proposed that were designed to improve monitoring of the fishery and provide better scientific information on which to base future decisions.

4.23 The second part of the question we need to answer therefore (and the crux of the objection) is whether the management action proposed represents a reasonable response to the need to apply the precautionary approach. We emphasize that what is required is a proportionate response, judged according to the level of risk.

Whether management action is a sufficiently precautionary response

4.24 The uncertainties associated with understanding the impact of the GOA pollock fishery on Steller sea lions and their recovery are well recognised and are reflected in the considerations of both the Certification Body and the submission by the Objectors. Both recognise that a range of interpretations are possible from existing data and that scientific uncertainty will not be totally eliminated. Our view of the present uncertainties and hypotheses about the risk to recovery of the western Steller sea lion stock is that while the pollock fishery in not likely to be the main source of risk it is nonetheless a feasible risk that requires consideration. And that consideration especially relates to fishing in areas used by the sea lions for breeding and foraging by pups. We note that this concern was taken account of by the Certification Body and conditions applied to improve identified deficiencies in performance indicators 2.3.1 and 2.3.3. Specifically, the Certification Body required the fishery to design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on sea lion behaviour, breeding and population trends. Significantly, the Certification Body did not endorse the suggestion made by NRC to test the hypothesis that fishing influences Steller sea lion population dynamics by increasing fishing intensity, on the basis that it would be inappropriate to increase fishing intensity to levels that increase the risk to Steller sea lion populations.

4.25 The Objectors did not challenge the need for the additional research identified by the Certification Body, including the experiment(s) to directly test the effect of fishing on Steller sea lions. Rather they questioned whether, under the present uncertainties, those conditions should require additional constraints on the fishery in SSLCH while the research is being conducted. The Objectors suggest that:

> Until the questions are definitively answered about the relationship between the fisheries and Steller sea lion declines, the sea lions' foraging needs and critical habitat requirements, considering the low pollock abundance the certification should require precautionary management actions such as significantly reducing TAC levels or curtailing all fishing in critical habitat and instituting pollock spawning reserves.

4.26 We could agree with this point if the evidence were such as to suggest a reasonable likelihood that additional constraints, beyond those used already by the regulators or identified by the experiments proposed as a condition of certification, would have a significant prospect of achieving improved performance against MSC Principle 2. On balance, however, we consider that the level of risk involved does not warrant such additional constraints at this time. In reaching this view we have considered the range of uncertainties and risks and the likely consequences of requiring or not requiring additional constraints as a condition of certification. We also recognise that the existing constraints in SSLCH are a precautionary management response, based on possible but uncertain mechanisms of interaction, with no scientific certainty that they are necessary. And we further recognise that the status of the western stock of the Steller sea lion population is closely monitored and linked to strong legal obligations supporting recovery, so there is a high chance that any further deterioration of the stock would be detected and acted upon (including by the Certification Body in subsequent audits). Furthermore, the experimental approach to measuring the effects of the fishery on sea lions is widely considered to be the only way to definitively address the key questions and will require planned changes to the operation of the pollock fishery inside SSLCH. The conditions placed on the experiments ensure that at worst there will be no increase in the overall catch of pollock in SSLCH and that they should start quickly. These experiments are a significant condition on continued certification of the fishery. We conclude that additional constraints on fishing in SSLCH are not warranted at this time under the precautionary approach expressed in MSC Principle 2.

4.27 There are three further observations we make about the application of the precautionary approach in this case. First, we took into account the fact that the Objectors are unclear about exactly what additional measures should be applied in order to satisfy the requirement of a precautionary approach. We can accept as a general proposition that the burden of proving that the consequences

of a proposed activity fall below the relevant threshold of harm lies on the party proposing to carry out that activity. But just as lack of scientific certainty cannot be used as an excuse for regulatory inaction, so lack of scientific certainty cannot be used as a justification for the imposition of additional constraints without showing some nexus between the additional constraints proposed and a reduction in the likelihood of harm that is proportionate to the degree of risk. This can only be determined on the basis of findings of fact or probability as to the likely consequences of the proposed additional constraints. We have considered what additional constraints might be reasonably applied. We do not regard it to be justifiable to require reduction (or no further increase) in the percentage of the pollock catch taken in SSLCH over the period of the certification with the present uncertainties. Without the additional information to be generated by the conditions set by the Certification Body (especially the experimental observations in SSLCH under different fishery management situations) there would be no reasonable basis to set or justify additional conditions. In considering the desirability of additional seasonal closure during the period when pup rearing is underway we recognise that there are already closures, some seasonal and some year-round, in SSLCH and that these could be changed under existing management measures as new information becomes available. We do not consider that a specific condition of certification relating to this is justified at present.

4.28 The second general point we would make is that the application of the precautionary approach under MSC Principles in this assessment is focused narrowly on pollock, when there seems to be evidence that species other than pollock might be critical to successful lactation and rearing of pups and that all these species are likely to be subject to the long-term environmental fluctuations prevalent in the north Pacific. A decrease in pollock, due to a combination of fishery and natural environmental factors, may cause critical trophic pressures on sea lions if other appropriate prey are low in abundance as a result of the same fishery and natural environmental factors that affect pollock – potentially including ineffective or inadequately precautionary management measures. This must be addressed at the higher level of ecosystem linkages between multiple ecosystem components including the fishery, and not addressed only during the certification of a single species in the ecosystem. Several conditions of certification, including exploration of alternative coordinated harvest strategies for the entire suite of living resources of the GOA, could take better account of these issues. We consider that the response of the Certification Body to this situation was adequate. This is not to say that other actions might not be considered by fisheries management at the ecosystem, as opposed to the single species level, as appropriate.

4.29 Thirdly, we note that the use of B_{MSY} as a limit reference point is more restrictive on the fishery than most limit reference points usually applied in fisheries management. This reference point was selected by the Certification Body in part to reflect the uncertainties about the effect of low pollock abundance on predator populations (including Steller sea lions), and so is a precautionary element in the Certification Body's assessment of the fishery. Furthermore the use of $B_{20\%}$ as an additional fixed limit to the level of biomass reduction, with that limit based in the recruitment seen during a relatively productive period for pollock (1977-1999) and applied even if B_{MSY} is less than $B_{20\%}$, introduces another element of precaution. It also sets a much higher biomass limit that would result from using the average recruitment over both productive and unproductive periods combined, or the average of unproductive periods alone, although either of these approaches could be argued to be reasonable on some grounds. A practical consequence of this additional precaution in the 60 Scoring Guidepost is that if the recent downward trends in productivity of the GOA pollock stock continue, then it is likely that additional catch constraints will be needed to maintain the stock above the limit reference point in order to maintain certification. This in our view (and subject to our findings with respect to Issue 1) provides the critical link between the application of the precautionary approach in the context of MSC Principle 1, Criterion 2 and subsequent management action designed to achieve the objectives of MSC Principle 2, Criterion 3.

4.30 We consider that in the conditions for continued certification that have been identified by the Certification Body, this suite of measures represents a reasonable interpretation and application of the precautionary approach. We find that the decision of the Certification Body to focus the conditions on direct experimental testing of the effects of fishing is a reasonable one.

Objection Panel Decision for Issue 2

4.31 We allow the Determination to stand in relation to the second ground for objection.

5. SUMMARY OF PANEL FINDINGS AND CONCLUSIONS

5.1 In relation to the first ground for objection, we find that the Certification Body fell into error in the way in which it specified the 60 Scoring Guidepost for stock size of GOA pollock under performance indicator 1.1.2.1. In our view, the Certification Body should have made it clear that the 60 Scoring Guidepost requires that the biomass be both greater than the dynamic interpretation of B_{MSY} and greater than the static interpretation of $B_{20\%}$. This is a material error in the determination not only because specification of the relevant guideposts is required by the MSC Fishery Certification Methodology, but also because lack of clarity could result in unnecessary ambiguity in future audits.

5.2 Notwithstanding our findings that the justifications, interpretations and conclusions made by the Certification Body in relation to the 60 Scoring Guidepost are reasonable, **we have decided to remand the determination to the Certification Body only for the purpose of providing greater clarity in the specification of the 60 Scoring Guidepost for indicator 1.1.2.1.**

5.3 In relation to the second ground for objection, we consider that the conditions for continued certification under MSC Principle 2 identified by the Certification Body represent a reasonable interpretation and application of the precautionary approach in the circumstances of this particular fishery. We do not find that the determination was arbitrary or unreasonable or that it was vitiated by any violation of MSC procedures. **We therefore allow the Final Determination to stand in relation to the second ground for objection.**

5.4 Throughout the Panel's deliberations we have been especially conscious of the need to remain within the scope and powers set for us by MSC procedures and our terms of reference. In particular, we have refrained from substituting our own views and opinions for those of the Certification Body. The GOA pollock fishery is a complex and controversial fishery and many different interpretations of the available data and evidence are possible. The mere fact that the Certification Body and the Objectors were able to come to different views faced with the same body of material does not necessarily undermine the legitimacy of either point of view; rather it demonstrates the complexity of the issues under consideration.

5.5 Our deliberations have been confined to the two grounds of objection before us. In accordance with MSC procedures our function has been to determine whether the responses by the Certification Body to the grounds for objection were consistent with the MSC Principles and Criteria and to determine whether the assessments by the Certification Body were in any way arbitrary or unreasonable or violated MSC procedures. The distinction is between the situation where the Panel might prefer a different view (perhaps on marginal grounds) and one where it concludes that deficiencies in the process of reasoning and the application of the relevant principles by the Certification Body require it to adopt a different view. This process necessarily required us to provide our own interpretation of the relevant MSC Principles and Criteria and to apply this interpretation to the circumstances of the subject fishery. We have considered the Certification Body's assessment in the light of that interpretation and the Panel's judgments and interpretations are based on the existing MSC requirements and procedures.

5.6 A key feature of the GOA pollock fishery is the episodic change in productivity and ecosystem structure affecting the target species, food chains and top predators, that has now been well demonstrated to occur in this and other arcto-boreal ecosystems. These are natural 'regime shifts' but they interact with fishery productivity and the effects of the fishery on the ecosystem. They must be taken into account in assessing the status of the target species, in assessing the effects of the fishery on the ecosystem, and in deciding on management measures. The Certification Body's assessment of the fishery recognized the regime shift phenomenon, recognized the need for its consideration in setting the Scoring Guideposts, and provided a useful approach to dealing with the problem. Fisheries science and management however have lagged behind our growing understanding of the reality of long-term changes in physical climatic regimes. Management strategies for resources inhabiting environments where regime shifts occur are not fully developed. Sustainable yield almost certainly will vary dramatically over a production 'cycle' for this type of fishery, and so criteria or approaches based on assumptions of a constant 'maximum sustainable yield' are not appropriate. We are of the view that the MSC Principles and Criteria may not have completely taken into account regime shift phenomena. However, subject to our decision to make a limited remand on

Issue 1, we consider that the Certification Body has adequately interpreted these Principles and Criteria in assessing GOA pollock in a regime shift situation.

5.7 While we agreed with the Certification Body that the fishery meets the MSC Principles and Criteria at present, we consider that there is a significant probability that the fishery might not continue to meet them in future because of regime shifts. Currently the pollock stock may be in or entering a regime of low productivity. Natural periods of low productivity could conceivably result in the pollock stock failing to meet some of the minimum thresholds identified for continued MSC certification even in the absence of a fishery. Although not inevitable, it should not come as a total surprise if the fishery fails to continue to meet the MSC Principles and Criteria for certification at some time during periods of low productivity. Whether the fishery will continue to meet the MSC Principles and Criteria throughout periods of low pollock productivity will depend to a great extent on the adequacy of the harvest strategy, including spatial controls on fishing, to deliver the required performance for the target species and ecologically dependent species despite regime shifts. This is correctly the subject of several Conditions of Continued Certification set by the Certification Body. The continued audits against the Scoring Guideposts and Conditions for Continued Certification are particularly important in this fishery because of the possibility of reduced pollock productivity, with flow-on effects in the fishery and ecosystem, over the next about decade.

Annex I

Members of the Objections Panel

Dr Keith Sainsbury

Dr Keith Sainsbury has a PhD in marine ecology and mathematical modeling. He has conducted research on the assessment, ecology, exploitation and conservation of marine resources and ecosystems for over 25 years. This has included fishery assessment of resources that range from abalone to tuna and from Sub-Antarctic toothfish to tropical snappers. He was responsible for one of the first applications of actively adaptive management to a large-scale trawl fishery, which demonstrated the effects trawling on seabed habitats and introduced spatial zoning of trawling in the region. Dr Sainsbury led a research team to develop and apply scientific approaches to support integrated, regional and ecosystem-based management of marine ecosystems in Australia. This research team was also responsible for the scientific support for declaration of large marine protected areas around Macquarie Island, sea-mounts off southern Tasmania and the regional network of MPAs in SE Australia.

Dr Sainsbury is a Senior Principal Research Scientist with CSIRO, a Board member of the Australian Fishery Management Authority, a Board Member of the MSC and chair of the MSC's Technical Advisory Board.

Dr John Caddy

Dr Caddy is a scientist with long experience on a wide range of national and international issues related to marine fishery resources and their sustainable management, with various arms of government, research institutes, universities, and the private sector. He worked at FAO occupying the post of Chief of Marine Resources. Prior to working at FAO he held positions of increasing seniority in the Canadian Department of Fisheries and Oceans. He has published more than 100 papers and reports on a wide variety of technical issues related to fisheries, including population dynamics, sustainable fisheries management and the impacts of fishing on the marine environment. His interests include issues related to ecology in a broader sense, with a strong commitment to promoting strategies that allow sustainable development, but not at the expense of biodiversity and long-term impacts on the ecosystem.

Dr Caddy has previously been a peer reviewer of a fishery certification report, and so meets the requirement for at least one member of the panel to have previously been on an assessment team, a peer reviewer or on an Objections Panel.

Mr Michael Lodge

Michael Lodge is a barrister (Gray's Inn, London). He also has an MSc in Marine Policy from the London School of Economics. He is currently based in Paris on assignment to the OECD as part of the Secretariat of a Ministerial Task Force on IUU fishing on the high seas. From 1996 to 2004 he was Legal Counsel for the International Seabed Authority. Prior to joining ISA, Michael Lodge was Legal Counsel to the South Pacific Forum Fisheries Agency. From 1997 to 2000 he served as Executive Secretary of the Conference for Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific, which concluded with the adoption of the Honolulu Convention in 2000 and, in addition to his work at OECD, continues to serve as the Head of the Interim Secretariat for the Preparatory Conference for the Western and Central Pacific Fisheries Commission. He is also a part- time Immigration Judge in the United Kingdom, dealing with appeals on immigration, asylum and human rights matters. He has worked as a consultant on fisheries and international law in Europe, Asia, Eastern Europe, the South Pacific and Africa and has written widely on fisheries, the marine environment and deep seabed mining. He is associate editor of Volume VI of the prestigious University of Virginia Commentary on the UN Convention on the Law of the Sea, which covers the deep seabed mining provisions of the Convention and the 1994 Agreement relating to the Implementation of Part XI of the Convention.

Annex II

Environmental fluctuations and 'regime change' and some implications for management and assessment of GOA Pollock

One of the key issues faced by a certification body with respect to stocks in the North Pacific (and elsewhere), must be the observation that fishery productivity of this region appears to go through pronounced long term fluctuations. Whether these are considered regular or not, the question must be faced squarely of how a management body will deal with this situation, especially with respect to defining control laws and their components, the reference points. An important observation by the Certification Body in its response to the initial objection seems particularly relevant:

Which interpretation of B_{MSY} is the more appropriate for this stock?

They note that no operational interpretation of the MSC standard exists which provides clarity on benchmarks for fluctuating stocks. The report of the Objection Panel team addresses this last statement, using the Gulf of Alaska pollock fishery as an example.

Regime shifts in the North Pacific – what the literature says

It seems important to first address the question of long term fluctuations in environmental conditions in the GOA. A large body of literature now exists on this subject, whose reality cannot be doubted. We do not attempt an exhaustive review, but the few quotes which follow provide some understanding of a phenomenon which cannot be disregarded for long-term planning of fisheries of the region:

(1) The winters of 1999-2002 were characterised by pressure and temperature anomalies atypical of the N. Pacific. It is suggested that there was a similarity to the situation before the major regime shift of 1976-7. (Bond et al. 2003).

(2) Following a strong 'el Nino', the climate of the North Pacific underwent a rapid and striking transition in late 1998. Winds weakened in the G. of Alaska, and surface temperatures cooled by several degrees. It is suggested that a climate shift has occurred similar to that in 1947, and opposite to that which occurred in 1925-76. Ecosystem changes paralleled this. (Peterson and Schwing 2003).

(3) Halibut otolith oxygen isotopes support a 1977 regime shift in the North Pacific with a warming impact. A possible regime shift around 1990 coincided with a decrease in bottom temperature of about 2°C – suggesting a decadal scale of ocean environment (20-30 yr). (Gao and Beamish 2003)

(4) Large scale shifts in climatic/oceanic conditions occurred in 1925, 1947, 1977, 1989 and possibly 1998. Shifts occurred abruptly. Data from the N Pacific show that regime shifts have opposite effects on species living in different domains. Taking the natural variability of stocks in association with regime shifts requires new approaches to managing fisheries that incorporate climatic as well as fishery effects (Benson and Trites 2002).

(5) In the early-mid 1980s: strong increases in stock size of walleye pollock and other fish occurred. There was a much higher biomass of groundfish in 1980-2000 than in 1960-85 (Conners et al. 2002).

(6) In relation to environmental impacts on pollock recruitment, Dorn et al. (2003) mention the use of rainfall data and wind strength and its impact on recruitment and feeding processes: 'Following the decadal trend established in the late 1990s, wind mixing at the southern end of Shelikov Strait was again below the long-term average for the winter and spring months of 2004. Strong mixing in winter helps transport nutrients into the upper ocean layer to provide a basis for the spring phytoplankton bloom. Weak spring mixing is thought to better enable first feeding pollock larvae to locate and capture

food. Weak mixing in winter is not conducive to high survival rates, while weak mixing in spring favours recruitment. This year's scenario produces a wind mixing score of 1.99, which equates to "average".

It is clear that pollock recruitment is heavily influenced by environmental factors which change over time. From the Dorn *et al*. report we have the following statement:

"Hollowed et al. (2001) found similarities in the recruitment patterns of the dominant gadoids in the North Pacific. In general, gadoids exhibited low autocorrelation in recruitment, with most of the variability occurring at the inter-annual level. Pollock and Pacific cod in the Gulf of Alaska and Pacific hake off the US West Coast showed a higher incidence of strong year classes in those El Niño years when anomalous conditions propagated to northern latitudes ("Niño North" conditions)."

These changes were consistent through the Northeast Pacific:

"Brodeur and Ware (1995) provide evidence that biomass of zooplankton in the centre of the Alaska Gyre was twice as high in the 1980s than in the 1950s and 1960s, consistent with a shift to positive values of the PDO since 1977."

From this selection of a much larger literature, we can safely base our view that regime shifts regularly occur in the North Pacific and have major effects on many fisheries and marine populations there. Also these shifts occur at fairly regular intervals which are estimated to correspond on average to intervals of 20-30 yr. From analysis of Greenland ice cores dating back thousands of years, Klyashtorin (2001) suggests that at least in the northern Hemisphere and probably globally, we are dealing with a climatic oscillation having an approximately 55-60 yr periodicity (i.e. successive shifts from good to poor regime and back again occur approximately every 25-30 yr). MacCall (2002) tends to confirm these intervals for east Pacific resources and draws attention to the problem of attempting to manage a food web complex which is subject to such low-amplitude, long-term fluctuations. Dorn *et al*. (2003) also provides some indication that despite the fairly recent data series for this species, the recent peak in pollock abundance does not represent a level of high stock sizes over the medium to long term:

"Questions concerning the comparability of pollock CPUE data from historical trawl surveys with later surveys probably can never be fully resolved. However, because of the large magnitude of the change in CPUE between the surveys in the 1960s and the early 1970s using similar trawling gear, the conclusion that there was a large increase pollock biomass seems robust.

"Model results suggest that population biomass in 1961, prior to large-scale commercial exploitation of the stock, may have been the lowest observed. Early speculation about the rise of pollock in the Gulf of Alaska in the early 1970s implicated the large biomass removals of Pacific Ocean perch, a potential competitor for euphausid prey (Somerton et al. 1979, Alton et al. 1987). More recent work has focused on role of climate change (Anderson and Piatt 1999, Bailey 2000). The occurrence of large fluctuations in pollock abundance without large changes in direct fishing impacts suggests a need for conservative management."

With respect to Alaska pollock the above statement suggests that biomass was much lower in the 1960-85 period than subsequently, and the implication is that this was not just (or even mainly) due to overfishing at that time. This raises the critical question of the stability of stock size for GOA pollock, and suggests that its distribution (in space, but also in relation to SSL colonies) prior to the international fishery was different from the current situation.

In conclusion on this point, evidence from time series analysis suggests that the groundfish, salmon and pelagic fish stocks for which fisheries have been ongoing for half a century or more have shown major order of magnitude changes in abundance in the North Pacific. Klyashtorin is more ambitious than most researchers in projecting production cycles into the future assuming the 55-60 year periodicity he found from Greenland ice cores. He goes as far as to provide these predictions, including that Alaskan pollock will go through a low levels of fishery landing between about 2010 and

2020. Although there are differing interpretations as to the reliability of forecasts of landings as opposed to biomass (given that landings are also determined by fishing effort and are influenced by management measures), this certainly raises the spectre that any certification provided to this fishery risks being reversed in the not too distant future.

Given that the quasi-cyclic phenomena discussed earlier lead to periodicities in the productivity of specific resources, it seems highly likely that the current decline in both Steller sea lions and GOA Pollock fall into the category of regime-influenced resources. Hence they may both be declining for reasons that are not entirely due to fishing of pollock. To assume that there is a direct cause-effect relationship between only two food web components, namely pollock abundance and reproductive success of Steller sea lions, does not consider the possibility that both are being affected by similar environmental changes, and that these may be acting more directly on Steller sea lion stock abundance. For example some hypotheses link the decrease in Steller sea lions to a current low availability of high-lipid food species, with the same oceanographic regime changes that increased pollock production having decreased the production of these high lipid species.

Setting reference points where fluctuations in productivity prevail

We now return to the questions mentioned earlier: the Certification Body Scoring Guidepost that there should be:

> ***"a reasonable chance that the stock is at or above B_{MSY} or its equivalent",*** and the Objectors rebuttal that***: "there is no question that the GOA stock is significantly below MSY"*** and hence that ***"the fishery should fail this performance indicator".***

One initial comment relates to the use of MSY as a limit reference point. The 1995 UN Fish Stocks Agreement appears to have effectively ruled against F_{MSY} as a target reference point, and there is a significant body of recent literature addressing the lack of precaution which results if this reference point is used as a target for management. Rather F_{MSY} is regarded as a limit reference point.

Following production model theory, the MSY is the level of harvest providing the highest long-term yield from the resource. In its conventional theoretical development it is considered to be a fraction of the virgin population size B_0, and for a population existing in a steady state with constant food resources and environmental conditions, B_0 (and hence MSY) were usually regarded as constants. But this perception is now changing since it has been recognized for some time, both in the N. Pacific and elsewhere, that recruitment is often either irregular or shows quasi-cyclic fluctuations (see e.g., Caddy and Gulland 1983 and Spencer and Collie 1997). The exploitation strategy adopted in most managed fisheries is to aim for a constant exploitation rate and variable yields rather than a reference point set specifically in terms of yield (e.g. Walters and Parma 1996). Subsequently, while discussing the North Pacific halibut fishery where similar environmentally-linked stock fluctuations have been documented, Parma (2002) argued that a robust fisheries control rule is what is needed to manage this type of fishery. Such a control rule seems to be in place in the form of the tiered control rule introduced by NMFS in the northern Pacific.

We agree therefore with the Certification Body when they state:

> *B_{MSY} is inherently an equilibrium concept, and as far as pollock is concerned, the GOA is not an equilibrium system. All this implies that evaluation of the fishery against this scoring indicator is not straightforward.*

If we assume that B_{MSY} is some fixed proportion of B_0, and that the unexploited stock also shows major fluctuations in biomass over time, then we have to reach the conclusion that MSY should vary in tune with the environmentally-determined virgin stock size that would have applied if there were no fishery operating. On this point the Certification Body report states in discussion of indicator 1.1.2.1 that:

> *If environmental variability is ignored and B_{MSY} is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below B_{MSY}, and the stock is overfished based on the standard suggested for this scoring indicator.*

The production conditions in 1977 are different from those today, therefore MSY should not be regarded as a constant proportion of the 1970's estimate of virgin population size, or be derived from productivity conditions that are not currently relevant. We see however that a limit reference point, namely that at which the fishery should be closed to fishing, could usefully be defined as a proportion of the average production over a period regarded in some way as appropriate – in the case of pollock the period 1977-1999 was selected and is a period of reasonably high productivity. In relation to the objector's comment therefore, and assuming that it should read *"there is no question therefore that the GOA stock is significantly below B_{MSY}*," we could probably agree that the GOA stock is below the B_{MSY} as defined as a proportion of the constant stock size implied by the average recruitment between 1977 and 1999. Appendix 3 in the Certification Body assessment report provides an explicit discussion of this issue. The conclusion, which we find reasonable, was that the stock in 2002 was 40 – 46% of the size it would have been in the absence of fishing but in the presence of recruitment fluctuations. This is a robust conclusion across three assumptions about the stock and recruitment relationship. That level of depletion is less than the depletion to 35% of the unfished stock which for pollock is regarded as the level of depletion at B_{MSY}, and so in this dynamic interpretation of MSY the pollock stock has not been below B_{MSY} in the history of the fishery.

On this point, we therefore agree with the assessment team when it states:

> *The results in Appendix 3 suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level relative to where it would have been now if the stock had never been fished is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these levels are well above the proxy $B_{35\%}$ level for B_{MSY} if the latter is viewed as a potentially dynamic quantity.*

A general comment is that since stock replenishment is the main concern of stock management, %SPR criteria have been widely adopted as substitute criteria for B_{MSY} or F_{MSY}. These criteria are adjusted to reflect a minimum allowable egg production per recruit. Because %SPR criterion are expressed 'per recruit' it remains to a degree independent of the virgin stock size estimate. However fishing at a given F(%SPR) does not assure a constant number of fertilized eggs in successive years if stock size is fluctuating, nor does adherence to this criterion ensure that a constant number of recruits survive through varying oceanic conditions each year. That is %SPR criteria do not guarantee the number of 'recruits per recruit' across generations, and hence that the population is sustained, without knowledge or assumption about the relationships between stock size, environmental conditions and subsequent recruitment. As shown by the literature, survival of pollock eggs to recruitment fluctuates depending on environmental state, temperature and currents, all of which are involved in the regime shift phenomenon. Thus, population fecundity as given per recruit by the %SPR criterion, says little or nothing concerning the success or otherwise of spawning, which is probably as much a function of environmental conditions as spawning stock size. The history of GOA pollock has shown that small spawning stocks have given rise to large recruitment and conversely large spawning stocks have given rise to weak recruitment. It also seems likely that spawning in some locations is more successful than in others; this issue is mentioned in several papers and is touched on in the following section.

Sources and sinks

A quote from the Dorn *et al*. report suggests that some components of the pollock stock area are in more urgent need of conservation than others:

> *"Olsen et al. (2002) suggest that interannual genetic variation may be due to variable reproductive success, adult philopatry, source-sink population structure, or utilization of the same spawning areas by genetically distinct stocks with different spawning timing. Peak spawning at the two major spawning areas in the Gulf of Alaska occurs at different times. In the Shumagin Island area, peak spawning occurs between February 15- March 1, while in Shelikov Strait peak spawning occurs between March 15 and April 1."*

What seems implied by this statement is that the GOA pollock have one or possibly two preferred spawning locations, and that the stock may be operating under a 'source and sink' modality. In this

the stock boundaries would shrink under unfavourable conditions to encompass the likely narrower stock distribution boundaries, such as Shumagin Island and Shelikov Strait, at the low point of the production cycle but occupy a much larger foraging area when conditions are suitable (so long as the stock was not excessively depleted by fishing). One feature of source and sink populations, especially when stocks are at their low point, is that the main recruitment comes from the source area or areas. A safety margin would therefore be provided by placing part of this area within a Marine Protected Area or similar management arrangement that provides spatial protection to ensure a significant stock component survives the low point in the production cycle (which Klyashtorin implies will occur some time around 2010). It is not clear to what extent the existing protected areas achieve this, although the GOA pollock fishery has significant areas closed or with limited access by fishing.

What do international fisheries agreements say about what to do during regime shifts?

Article 7.5.3 of the FAO Code of Conduct for Responsible Fisheries states that management authorities

> *should use the best scientific advice available in order to set target and limit reference points for the fishery, and that as limit reference points are approached, measures should be taken to ensure that the limit reference point is not exceeded.*

However, marked fluctuations in stock size may be caused by natural phenomena and on this point, Article 7.5.5 of the Code states:

> *If a natural phenomenon has a significant adverse impact on the status of living aquatic resources, States should adopt conservation and management measures on an emergency basis to ensure that fishing activity does not exacerbate such adverse impact. States should also adopt such measures on an emergency basis where fishing activity presents a serious threat to the sustainability of such resources. Measures taken on an emergency basis should be temporary and should be based on the best scientific evidence available.*

Article 6.7 of the UN Fish Stocks Agreement uses much the same wording as the Code with respect to natural phenomena affecting productivity: i.e. steps should be taken to ensure that fishing does not exacerbate an already negative natural effect.

In conclusion on this point, as the nadir of the production cycle in GOA Pollock is approached, the sustainable yield will have to be curtailed if ensuring that the food requirements of Steller sea lions are met is a key consideration.

Conclusions

1. There is good evidence that the North Pacific is subject to environmentally-driven 'regime shifts' that affect (positively and negatively) whole groups of species on a multi-decadal scale.

2. The pollock appears to be one of a suite of species that increased greatly in biomass during the most recent regime shift, following several years of very strong recruitment in the 1970s (and sporadically about every 5 years since). There is some indication that the regime reversed again in the late 1990s.

3. The question of just what reference point is appropriate for a species where productivity is fluctuating has been discussed. Clearly, assessing the present status of the population against a static virgin stock size, estimated during earlier high productivity conditions, must be misleading. If MSY conditions are the criterion, this should be related to the standing stock which would be in place if the stock were currently unexploited. It is not possible to estimate this quantity exactly, but using a fixed B_{MSY} level as a standard of comparison is misleading. However we find the use of a fixed biomass minimum below which fishing should cease can usefully be defined by a static model. We need other criteria and conceptual models that take variation more explicitly into account.

4. The varying productivity of many marine resources, here and elsewhere, and the demands being made on them both by marine mammals and man at different stages of the production cycle are clearly threats to sustainability, unless the periodic nature of production cycles is taken into account. The negative experience of East coast Canadian groundfish fisheries which have been at all-time lows for a decade or more, in part due perhaps to past overfishing, but also due to currently poor environmental conditions, needs taking into account. As does the East Atlantic cod story. Nonetheless, evidence to date suggests that the situation with respect to GOA pollock is not yet at a critical point, but it would seem timely at this point to develop a strategy for preventing stock size declining too low, or even to begin planning for stock recovery should events later in this decade prove unfavourable, as at least one prediction in the literature suggests.

5. That the biomass in 2003-4 was below the predicted B_{MSY} calculated with data from when the stock was higher (in the 1970's), may be formally correct. This does not take into account the reality that the fishery is being managed in an attempt to take into account natural stock declines. Whether this attempt will be successful as and if stocks continue to decline, and what additional measures should be taken, and in response to which biomass reference points, is the key question discussed in the main body of the report.

6. Taking a 'traditional' approach and considering B_{MSY} to be a constant, as mentioned, is misleading in the case of GOA pollock. This is the reason why %SPR criteria were used in the development of alternative reference points - explicitly in $B_{35\%}$ and implicitly $35\%_{unfished}B$. It has to be stressed however that the 'per recruit' approach does not guarantee either a specific population fecundity or a given number of new recruits. It even seems likely that oceanic conditions for survival of eggs and larvae to recruitment will deteriorate during the low point of the production cycle.

7. The recent decline in GOA pollock was caused by both fishery removals and reduced recruitment, with reduced recruitment being environmentally forced and to be expected even in the absence of a fishery. This does not mean that the decline in environmental conditions should not be taken into account in setting quotas, and the tier approach is obviously attempting to do this. The FAO Code of Conduct and 1995 UN Fish Stocks Agreement both require that action be taken whether the decline is due to overfishing or natural causes.

8. Given that major fluctuations in many Gulf of Alaska resources seem to be a reality, it is almost certain that the abundance of predators will also have shown periodic declines in the past in response to changed densities of food organisms, and to changes in the location of preferred food organisms in relation to their home ranges. A die off of certain predators, and competition between sea lions and other unexploited predators would have been expected even if pollock were not exploited. Possibly the stock size of sea lions and other apical predators prior to commercial fishing was controlled by the low point in the production cycle of GOA Pollock and other food resources. And this low point will inevitably be more stressful for dependent species if human harvest continues through the low points of fish abundance. Ultimately the food requirements of dependent species will have to be taken into account through a multispecies, diet-related approach.

9. Under some hypotheses declines in predator populations are to be expected as pollock stocks decline, and the impact of the fishery on predator food availability is going to be highest at the low point in the pollock production cycle. The question is left unresolved as to whether under these hypotheses the tier approach to setting harvest strategies will ensure an adequate food ration during the low point of the pollock cycle. Instituting a closure at $B_{20\%}$ of pollock biomass based on a period of moderate to high pollock productivity is an attempt to leave an adequate biomass for recovery of the stock and survival of the top predators. While it is not clear that this will achieve the two objectives of this measure, it appears to be a useful step in that direction, especially when combined with measures already taken to institute closures around sea lion colonies and other designated critical foraging areas and habitats.

10. For a fluctuating meta-population a safety measure both for sea lions and pollock would have to incorporate a spatial or geographical component. The approach taken of 'spreading' the quota over seasons and sub-areas helps in this respect, but may not be adequate on its own. Accepting that a source-sink scenario may apply would suggest making provisions whereby areas close to sea lion rookeries are closed to fishing. For example, the supposed source population in Shelikov

Strait or in other spawning areas might be protected by a fishery closure of some fraction of the Strait, especially during years when the biomass falls below some pre-established minimum. Such measures would seem to provide an important safety margin in case errors in stock surveys lead to quotas being overestimated. This might be especially likely to occur with a fixed stratification scheme if the stock range of the organism being surveyed is shrinking or expanding. Some such spatial protection is provided by the existing management arrangements, but it is unclear whether they are adequate.

11. Although some provisions have been made for the food requirements of top predators in current regulations, it remains to be seen if the measures incorporated into the management rule and the quota splitting provisions by area and season will be adequate to ensure survival of top predators through a low point in the pollock production cycle. It has been suggested that such regime shifts will be associated with natural declines in predator populations, and in fact function as overall constraints on their stock size. Adding a further depletion to pollock stock sizes when they are at a natural low point would seem to increase the risk to top predators, since at this time alternative food species will be less available, given that other important species seem to decline in synchrony with pollock stocks.

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FINAL DECISION AND SUMMARY REPORT OF THE MARINE STEWARDSHIP COUNCIL (MSC) INDEPENDENT OBJECTIONS PANEL ON THE GULF OF ALASKA POLLOCK FISHERY

MSC Independent Objections Panel:

Dr. Keith Sainsbury Dr. John Caddy Mr. Michael Lodge

1 April 2005

FINAL DECISION AND SUMMARY REPORT OF THE MARINE STEWARDSHIP COUNCIL (MSC) INDEPENDENT OBJECTIONS PANEL ON THE GULF OF ALASKA POLLOCK FISHERY

INTRODUCTION

1. This document is the summary version of the Report of the Objections Panel convened by MSC to consider stakeholder objections to the determination by an MSC-accredited certification body, Scientific Certification Systems Inc. (SCS) (referred to herein as "the Certification Body") that the Gulf of Alaska Pollock Fishery should be certified as meeting the standard set by the MSC Principles and Criteria for Sustainable Fishing. The deliberations of the Objections Panel were confined to the two specific and relatively narrow grounds of objection referred to it by the MSC Board. In accordance with MSC procedures the function of the Panel was to determine whether the responses by the Certification Body to the grounds for objection were consistent with the MSC Principles and Criteria and to determine whether the assessments by the Certification Body were in any way arbitrary or unreasonable or violated MSC procedures. The Objections Panel made findings on each of the issues that had been referred to it. On one issue the Panel allowed the determination of the Certification Body to stand. On the other issue, the Panel decided to remand the determination to the Certification Body to provide further clarification. That clarification was subsequently received and found acceptable. The findings of the Objection Panel, and the reasons for those findings, are set out in detail in the full report of the Objections Panel. This document is merely a summary of the process and findings of the Objections Panel and the reader interested in more detail is encouraged to review the full text version of this report.

2. The Objections Panel finds that, based on the assessment report, as revised, the Gulf of Alaska pollock fishery may properly be certified as meeting the standard set by the MSC Principles and Criteria for Sustainable Fishing.

THE CERTIFICATION PROCESS AND GROUNDS FOR OBJECTIONS

3. The certification process for the GOA Pollock Fishery commenced in 2001. In accordance with MSC certification procedures, a draft determination was issued by the Certification Body in November 2003. The final determination was issued on 2 July 2004. An initial objection to this determination was submitted on 4 August 2004 on behalf of three non-governmental organizations: Alaska Oceans Program, Greenpeace International and National Environmental Trust ("the Objectors"). The Certification Body responded to that objection on 24 September 2004. On 16 October 2004, the Objectors submitted a further objection to the MSC Board, which duly considered the further objection and issued a decision on 22 October 2004. In its decision, the MSC Board dismissed the further objection on all but two grounds, which it decided to refer to this Objections Panel. Those grounds were are follows:

(1) Low stock size of GOA pollock

The Objectors contended that the fishery should have failed its assessment against MSC Principle 1, Criterion 1, i.e. that 'the fishery shall be conducted at catch levels that continuously maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.' Specifically, the Objectors argued that the Certification Body should not have considered the fishery to pass the minimum Scoring Guidepost (60) under performance indicator 1.1.2.1, which requires that "stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent."

(2) Catch inside Steller sea lion critical habitat

The second ground for objection questioned whether, in the light of its findings in relation to the impacts of the GOA pollock fishery on Steller sea lions, the measures and conditions proposed by the Certification Body were sufficiently precautionary when measured against

the standards set by MSC Principle 2. The Objectors asserted that the conditions set did not go far enough to address a number of serious concerns reflected in the determination, and suggested that immediate precautionary management action was called for, such as significantly reducing TAC levels or curtailing fishing in critical habitat and instituting pollock spawning reserves. In responding to the Objectors, the Certification Body asserted that the balance of scientific opinion indicates that factors other than pollock fishing are likely to be the cause of Steller sea lion decline and that additional research aimed at directly testing the impacts of the pollock fishery on Steller sea lions would be appropriate. The Objectors argued that the need for more information should not be used as an excuse to delay precautionary measures while research continues. It was acknowledged by both parties, and by the MSC Board, that the essence of the objection is what properly constitutes a precautionary approach in the context of the MSC Principles and Criteria for Sustainable Fishing.

OBJECTIONS PANEL: SUMMARY OF FINDINGS

4. The Objections Panel was constituted by the MSC Board as follows: Dr Keith Sainsbury (an MSC Board member), Dr John Caddy and Mr Michael Lodge. Details of the qualifications and experience of the members of the Objections Panel appear in Annex I of the full report.

5 In approaching its task, the Objections Panel noted that the intent of the MSC objections procedure is to provide an orderly and structured process by which concerns about certain aspects of the assessment and the Certification Body's determination can be transparently addressed and resolved. The Objections Panel is not entitled to conduct a full reassessment of the fishery against the MSC Principles and Criteria; nor is the Objections Panel entitled to substitute its own views and opinions for that of the Certification Body. The purpose of the Objections Panel is solely to examine the claims made by the Objectors and determine whether the responses by the Certification Body to those claims are consistent with the MSC Principles and Criteria and the MSC process. The Objections Panel may either allow the determination to stand or may remand the determination to the Certification Body with instructions to reconsider significant procedural issues or information omitted or inadequately considered. A determination may be remanded only on the grounds that it is arbitrary or unreasonable or that there has been a violation of MSC procedures and it is probable that the violation changed the outcome of the determination. The scope and powers of Objections Panels are set out in the MSC Objections Procedure (dated 12 July 2004) and the MSC Terms of Reference for Objections Panels.[1]

6. In the present case, the deliberations of the Objections Panel were confined to the two specific and relatively narrow grounds of objection referred to it by the MSC Board. The Objections Panel conducted its deliberations by telephone and email during December 2004 and January 2005. The Panel did not consider it necessary to call on the Certification Body, the Objectors or the subject fishery to make oral representations; nor did any party request an oral hearing. As the basis for its deliberations, the Objections Panel considered the key source documents used by the Certification Body in its assessment, the Certification Body assessment report, the Certification Body response to the Objection, the key source documents used by the Objectors, and both the Objection and the Further Objection lodged by the Objectors. In addition, the Panel drew upon other information and reports relevant to the issues (referred to as necessary in the full text report) and also examined the 2004 NPFMC SAFE report for GOP pollock that was not available at the time of the Certification Body assessment and determination.

7. The Objections Panel issued its report in February 2005. In relation to the first ground for objection (low stock size), the Panel found that the Certification Body fell into error in the way in which it specified the minimum (60) Scoring Guidepost for stock size of GOA pollock under performance indicator 1.1.2.1, namely that "Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent." In the view of the Panel, the Certification Body should have made it clear that the 60 Scoring Guidepost requires that the biomass be both greater than the dynamic interpretation of B_{MSY} and greater than the static interpretation of $B_{20\%}$. The Panel found that this constituted a material error in the determination not only because specification of the relevant guideposts is required by the MSC Fisheries Certification Methodology, but also because lack of clarity could result in unnecessary ambiguity in future audits. For these reasons, the Panel decided to

[1] Terms of Reference for MSC Objections Panels (Version 2, July 2004), MSC.

remand the determination to the Certification Body only for the purpose of providing greater clarity in the specification of the 60 Scoring Guidepost for indicator 1.1.2.1.

8. On 15 March 2005, the Certification Body responded to the Panel's remand by proposing appropriate revisions to the assessment report to make it clear that, in scoring the fishery against this indicator, the 60 scoring guidepost is interpreted as requiring that the stock remain both above the dynamic interpretation of B_{MSY}, and above the static interpretation of $B_{20\%}$. The Certification Body also proposed an amendment to the certification conditions associated with this indicator to require that alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation. Specifically, the testing of alternative harvest strategies should evaluate whether the criterion that the stock should remain above the static version of $B_{20\%}$ provides sufficient protection for predators of Pollock. The response by the Certification Body is appended to this Summary Report as Attachment A.

9. The Objections Panel finds that the response by the Certification Body adequately deals with its concerns on this issue.

10. In relation to the second ground for objection, the Panel considered that the conditions for continued certification under MSC Principle 2 identified by the Certification Body represented a reasonable interpretation and application of the precautionary approach in the circumstances of the fishery. The Panel did not find that the determination was arbitrary or unreasonable or that it was vitiated by any violation of MSC procedures. The Panel therefore allowed the Final Determination to stand in relation to the second ground for objection.

11. Accordingly, the Objections Panel finds that, based on the assessment report, as revised, the Gulf of Alaska pollock fishery may properly be certified as meeting the standard set by the MSC Principles and Criteria for Sustainable Fishing.

PANEL CONSIDERATIONS

12. The full text report contains sets out the substantive consideration by the Panel of the issues involved.

13. In relation to the first ground for objection, the Panel considered that current fisheries practice suggests that B_{MSY} is a suitable limit reference point for biomass. The use of $B_{35\%}$ as a proxy for B_{MSY} (both as constant or dynamic interpretations) is well established and justified in the GOA pollock fishery assessment literature and the Panel agreed with the Certification Body's decision to use this proxy. The Panel considered at length the constant and dynamic interpretations of B_{MSY} , and the constant and dynamic interpretations of its proxy $B_{35\%}$ and 35% of ${}_{unfished}B$ respectively, especially in the context of an ecosystem subject to periodic changes in environmental forcing as well as the effects of fishing. The Panel found the dynamic approach to B_{MSY}, and the dynamic equivalent of its proxy, adopted by the Certification Body to be innovative and appropriate and noted that the weaknesses of the dynamic approach to B_{MSY} and its proxy had been recognised by the Certification Body and reasonably addressed. The possibility that the dynamic interpretation of B_{MSY} and its proxy could result in very low biomass levels during prolonged periods of low productivity had been explicitly considered by the Certification Body, which concluded that reasonable protection was provided by stopping fishing if the biomass was below the constant interpretation of $B_{20\%}$ (using the average recruitment 1977 – 1999).

14. The Panel agreed with both the Certification Body and the Objectors that a cessation of fishing if the biomass falls below the constant interpretation of $B_{20\%}$ would be a reasonable additional constraint on the dynamic interpretation of B_{MSY} in the context of the GOA pollock fishery. For these reasons, the Panel accepted that the the dynamic interpretation of B_{MSY} (i.e. 35% of the dynamically calculated ${}_{unfished}B$ each year), combined with the additional constraint that the stock biomass should be above the constant interpretation of $B_{20\%}$, provided a realistic and reasonable limit reference point for GOA pollock – and thus a reasonable interpretation of the 60 Scoring Guidepost requirement that "the reference biomass is B_{MSY} or its equivalent, and takes into account the natural variability of the stock".

15. The reason for remanding the matter to the Certification Body, however, was that the Panel considered that the Certification Body did not provide a single and succinct statement of the dual condition that comprises the 60 Scoring Guidepost, although its intent and interpretation was clear in the discussion and justification of the score it gave. The lack of a single and succinct statement of the 60 Guidepost could cause misunderstanding. The lack of clarity that the Guidepost requires the stock to be above the static interpretation of $B_{20\%}$ for continued certification appeared to have also been one element in the concerns of the Objectors. In this regard, the Panel also noted that the indicator of stock depletion using the dynamic interpretation shows that fishery depletion of the stock increased from 65% to 44% between 1995 and 2002, the last year for which these calculations have been reported. If depletion continues at that rate it will breach the dynamic limit of 35% $_{unfished}B$, and possibly also the constant $B_{20\%}$ limit, within a few years. Further decrease in pollock productivity over the next approximately ten years is also expected by some scientists on the basis of some hypotheses linking pollock productivity and oceanographic fluctuations, which if borne out will also contribute to downward trends in the pollock population toward and possibly below the 60 Scoring Guidepost.

16. The Panel noted that the second ground for objection raised broad questions about the appropriate interpretation of and management response to the impact of pollock stock condition on endangered Steller sea lions. The finding of the Certification Body was that the management system has kept the impact of the fishery on a protected, threatened or endangered species within agreed and reasonable bounds. For the Panel, the key issue under the second ground of objection, however, was whether the measures and conditions proposed by the Certification Body were sufficiently precautionary in relation to the impacts of the pollock fishery on Steller Sea Lions when measured against the standards set by MSC Principle 2.

17. In addressing this question, the Panel first sought to provide guidance on the correct interpretation of MSC Principle 2 in the light of international instruments (such as the FAO Code of Conduct and the UN Fish Stocks Agreement) dealing with the application of the precautionary approach to marine capture fisheries. Overall, the Panel understood the intention of MSC Principle 2 and its associated Criteria as an attempt to apply the precautionary approach to recovery of elements of the ecosystem that have been depleted by fishing, or risk being so depleted, to an extent that is not consistent with maintaining the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species). It noted that such an interpretation necessarily implied that there be some causal link between fishing of the target stock and the associated or dependent species (although clearly that link need not be the only or even the most proximate cause of depletion). In the absence of any specific guidance in the MSC Criteria, the Panel's understanding was that regulatory action should be consistent with that proposed in the operational statement of the precautionary approach to fisheries in the FAO Code of Conduct and elaborated in the FAO Technical Guidelines. This strongly suggested to the Panel that a precautionary response would imply, as well as appropriate regulatory action, the establishment of precautionary reference points for the target species such as would have the effect of reducing the magnitude of the present stock depletion and reducing the likelihood of further depletion.

18. The Panel considered that the Certification Body had reasonably interpreted the precautionary approach in its assessment of the fishery (including Principle 2). Overall the approach taken by the Certification Body was found to be consistent with the Panel's interpretation of the precautionary approach as expressed in the MSC Principles and Criteria.

19. In considering whether the management action proposed by the Certification Body represented a reasonable response to the need to apply the precautionary approach, the Panel noted that the uncertainties associated with understanding the impact of the GOA pollock fishery on Steller sea lions and their recovery were reflected in the considerations of both the Certification Body and the submission by the Objectors. Both recognised that a range of interpretations are possible from existing data and that scientific uncertainty will not be totally eliminated. The Panel's view of the present uncertainties and hypotheses about the risk to recovery of the western Steller sea lion stock is that while the pollock fishery is not likely to be the main source of risk it is nonetheless a feasible risk that requires consideration, especially in relation to fishing in areas used by the sea lions for breeding and foraging by pups (SSLCH).

20. After full consideration of all the points raised by the Objectors, the Panel concluded that additional constraints on fishing in SSLCH were not warranted at this time under the precautionary approach expressed in MSC Principle 2. On balance, the Panel considered that the level of risk involved does not warrant such additional constraints at this time. In reaching that view the Panel considered the range of uncertainties and risks and the likely consequences of requiring or not requiring additional constraints as a condition of certification. It also recognised that:

(a) the existing constraints in SSLCH are a precautionary management response, based on possible but uncertain mechanisms of interaction, with no scientific certainty that they are necessary

(b) the status of the western stock of the Steller sea lion population is closely monitored and linked to strong legal obligations supporting recovery, so there is a high chance that any further deterioration of the stock would be detected and acted upon (including by the Certification Body in subsequent audits). And

(c) the experimental approach to measuring the effects of the fishery on sea lions is widely considered to be the only way to definitively address the key questions and will require planned changes to the operation of the pollock fishery inside SSLCH. The conditions placed on the experiments ensure that at worst there will be no increase in the overall catch of pollock in SSLCH and that they should start quickly. These experiments are a significant condition on continued certification of the fishery.

21. In light of its findings on Issue, 1, the Panel also gave preliminary consideration to the way in which the precautionary approach might properly be applied in situations where productivity is subject to changes in environmental regime and proposed a number of suggested considerations for a precautionary approach that takes this scenario into account (set out in the full text).

CONCLUDING COMMENTS

22. The GOA pollock fishery is a complex and controversial fishery and many different interpretations of the available data and evidence are possible. The mere fact that the Certification Body and the Objectors were able to come to different views faced with the same body of material does not necessarily undermine the legitimacy of either point of view; rather it demonstrates the complexity of the issues under consideration. The deliberations of the Objections Panel were confined to the two grounds of objection before us. In accordance with MSC procedures the function of the Panel was to determine whether the responses by the Certification Body to the grounds for objection were consistent with the MSC Principles and Criteria and to determine whether the assessments by the Certification Body were in any way arbitrary or unreasonable or violated MSC procedures. The distinction is between the situation where the Panel might prefer a different view (perhaps on marginal grounds) and one where it concludes that deficiencies in the process of reasoning and the application of the relevant principles by the Certification Body require it to adopt a different view. This process necessarily required the Panel to provide our own interpretation of the relevant MSC Principles and Criteria and to apply this interpretation to the circumstances of the subject fishery. We have considered the Certification Body's assessment in the light of that interpretation and the Panel's judgments and interpretations are based on the existing MSC requirements and procedures.

23. A key feature of the GOA pollock fishery is the episodic change in productivity and ecosystem structure affecting the target species, food chains and top predators, that has now been well demonstrated to occur in this and other arcto-boreal ecosystems. These are natural 'regime shifts' but they interact with fishery productivity and the effects of the fishery on the ecosystem. They must be taken into account in assessing the status of the target species, in assessing the effects of the fishery on the ecosystem, and in deciding on management measures. The Certification Body's assessment of the fishery recognized the regime shift phenomenon, recognized the need for its consideration in setting the Scoring Guideposts, and provided a useful approach to dealing with the problem. Fisheries science and management however have lagged behind our growing understanding of the reality of long-term changes in physical climatic regimes. Management strategies for resources inhabiting environments where regime shifts occur are not fully developed. Sustainable yield almost certainly will vary dramatically over a production 'cycle' for this type of fishery, and so criteria or approaches based on assumptions of a constant 'maximum sustainable yield' are not

appropriate. We are of the view that the MSC Principles and Criteria may not have completely taken into account regime shift phenomena. However, subject to our decision to make a limited remand on Issue 1, we consider that the Certification Body has adequately interpreted these Principles and Criteria in assessing GOA pollock in a regime shift situation.

24. While we agreed with the Certification Body that the fishery meets the MSC Principles and Criteria at present, we consider that there is a significant probability that the fishery might not continue to meet them in future because of regime shifts. Currently the pollock stock may be in or entering a regime of low productivity. Natural periods of low productivity could conceivably result in the pollock stock failing to meet some of the minimum thresholds identified for continued MSC certification even in the absence of a fishery. Although not inevitable, it should not come as a total surprise if the fishery fails to continue to meet the MSC Principles and Criteria for certification at some time during periods of low productivity. Whether the fishery will continue to meet the MSC Principles and Criteria throughout periods of low pollock productivity will depend to a great extent on the adequacy of the harvest strategy, including spatial controls on fishing, to deliver the required performance for the target species and ecologically dependent species despite regime shifts. This is correctly the subject of several Conditions of Continued Certification set by the Certification Body. The continued audits against the Scoring Guideposts and Conditions for Continued Certification are particularly important in this fishery because of the possibility of reduced pollock productivity, with flow-on effects in the fishery and ecosystem, over the next about decade.

Keith Sainsbury
John Caddy
Michael W. Lodge

GOA Pollock Fishery Objections Panel
April 2005

SCIENTIFIC CERTIFICATION SYSTEMS

Scientific Certification Systems, Inc.
Headquarters
2000 Powell Street, Suite 1350
Emeryville, CA 94608
Tel: 510.452.8000
Fax: 510.452.8001
http://www.scscertified.com

Chet Chaffee
2004 Sunnyview Lane
Mountain View, CA 94040
Tel: 650-969-1366
Fax: 650-969-4731
chaffe3@attglobal.net

15 March 2005

Dr. Keith Sainsbury
MSC Trustee & Chair of the Gulf of Alaska Pollock Fishery Objections Panel
C/O CSIRO Marine Research
GPO Box 1538
Hobart, Tasmania 7001
AUSTRALIA
(sent via email)

Dr. Sainsbury:

I am writing this letter to you in response to the findings of your committee reviewing stakeholder objections to the Gulf of Alaska (GOA) Pollock Fishery determination made by Scientific Certification Systems, Inc. (SCS). As required by the Marine Stewardship Council (MSC) Certification Methodology (Version 5, April 2004, Section 4.2.4.13), SCS is required to provide a response in writing for the objections panel to consider. I have worked with Dr. Tony Smith to provide appropriate language, as Dr. Smith has the most experience of the assessment team members in terms of stock assessments.

The Objection Panel Finding Section 3.24

Notwithstanding our findings that the justifications, interpretations and conclusions made by the Certification Body in relation to the 60 Scoring Guidepost are reasonable, we do consider that the Certification Body erred in failing to give sufficient clarity in its statement of the 60 Scoring Guidepost. Specifically, we consider that the Certification Body should have made it clear that the 60 Scoring Guidepost requires that the biomass be both greater than the dynamic interpretation of B_{MSY} *and greater than the static interpretation of* $B_{20\%}$. *This is a material error in the determination not only because specification of the relevant guideposts is required by the MSC Fishery Certification Methodology, but also because lack of clarity could result in unnecessary ambiguity in future audits. We have therefore decided to remand the determination to the Certification Body only for the purpose of providing greater clarity in the specification of the 60 Scoring Guidepost.*

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SCS Proposed Corrections in the GOA Assessment Report

In an attachment to this letter, I have copied the entire section from the evaluation report for Performance Indicator 1.1.2.1. I am proposing language changes in 2 places to meet the Objection Panel finding (although, other parts of the report may also be changed to reflect the revised language if they are summaries of the same material):

- Directly under the Scoring Guideposts
- In the section on the Condition associated with the indicator.

The proposed language is shown in the attachment in relation to the entire section and highlighted in yellow to assist the reader in finding the proposed revisions.

I trust the language proposed meets the objections panel need for clarification in the interpretation and use of the 60 scoring guidepost under Performance Indicator 1.1.2.1.

I thank you for your expert review of the objection and for your continued consideration in adjudicating this matter. We look forward to your response to our proposed revisions.

Sincerely,

Chet Chaffee
Vice President and Marine Fisheries Certification Manager
Scientific Certification Systems, Inc.

Cc: Chris Grieve (via email only)
Kate Troll (via email only)
Jim Humphreys (via email only)
Dr. Tony Smith (via email)
Dr. Robert Furness (via email)
Tom Jensen (via email)
Stacey Marz (via email)
Jim Gilmore (via email)

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ATTACHMENT

Assessment Report Section on Performance Indicator 1.1.2.1

SSC 1.1.2: Stocks are not depleted and harvest rates are sustainable.

In contrast to SSC 1.1.1, which evaluates generic properties of the harvest strategy, SSC 1.1.2 evaluates the current status of the target species or stocks, and the basis for being reasonably certain about their status. The Scoring Guideposts are arranged hierarchically, so that evaluation of the current status depends on the assessment, which in turn depends on data and knowledge about the stocks and the fishery.

Indicator 1.1.2.1: Current stock sizes are assessed to be above appropriate limit reference points.

The intent is to assess whether the stock is currently "overfished". There is no internationally agreed standard to define this. A recent FAO view is that target stocks should generally be maintained above B_{MSY}, which should be used as a limit reference point. An alternative (but not generally accepted) view is that explicit allowance should be made for predators by increasing target and limit levels well above B_{MSY} (e.g. the "CCAMLR" strategy). Stock levels can also fluctuate due to natural environmental variability, and this needs to be taken into account. In this regard, B_{MSY} is an equilibrium concept and is not easily defined for a naturally fluctuating stock. In the absence of precise or agreed definitions or standards, expert judgments will be made based on the following guideposts.

100 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 90% probability.
- The reference biomass is above B_{MSY} and takes into account the needs of predators.

80 Scoring Guidepost

- Stock assessments show the stock to be above the reference biomass with greater than 70% probability.
- The reference biomass is B_{MSY} or its equivalent and takes into account the natural variability of the stock.

60 Scoring Guidepost

- Stock assessments show that there is a reasonable chance that the stock is at or above B_{MSY} or its equivalent.

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Operational interpretation of the scoring guideposts

For the reasons outlined in detail in the report below, it is possible to interpret the reference biomass (B_{MSY}) in both a static and a dynamic sense. In scoring the fishery against this indicator, the 60 scoring guidepost is interpreted as requiring that the stock remain both above the dynamic interpretation of B_{MSY}, and above the static interpretation of $B_{20\%}$. For the 80 and 100 scoring guideposts, the static interpretation of B_{MSY} is the only interpretation required.

SCORE: 70

This scoring indicator was the subject of considerable debate during the course of the SCS evaluation process. The main point of contention was the choice in the scoring guideposts of B_{MSY} as a limit reference point, since it is used more as a target reference point in the NPFMC tier system, with half B_{MSY} being regarded as the limit reference point in the US National Standard Guidelines (MSST – see discussion for indicator 1.1.1.1). It was also argued by some staff at AFSC, by other staff in NMFS (Dr Pamela Mace), and by Dr Rick Deriso of the IATTC, that B_{MSY} is in fact not an agreed limit reference point for the FAO or an internationally agreed limit reference point, as stated in the "intent" section of this scoring indicator. While it is agreed that this latter point is substantially correct, this does not in fact seem entirely consistent with the general agreement, including in the NPFMC harvest strategies, that F_{MSY} is a limit reference point for fishing mortality (it is hard to see how B_{MSY} can be a target if F_{MSY} is a limit). The SCS team also noted that there are references in the international literature to B_{MSY} as a limit reference point (e.g. Jennings et al., 2001).

Notwithstanding the academic debate, the intent in choosing B_{MSY} as a limit reference point for Pollock was to ensure that a fishery for a species such as Pollock, which appears to be a key prey species in its ecosystem, should maintain the stocks at levels that would not jeopardize the productivity of key predator species (such as Steller sea lions). The issue of course is that there is no general agreement on what such levels should be (see detailed discussion of this issue in the preamble to the report on Principle 2).

Another complication in scoring this indicator is that, especially for a naturally fluctuating population, B_{MSY} is not a fixed entity, nor indeed is $B_{100\%}$ (unfished population level) nor any fraction of this (such as $B_{X\%}$). It has already been noted, and is discussed in detail under Principle 2, that the Gulf of Alaska appears to be subject to decadal or longer time scale shifts in productivity ("regime shifts"), and that Pollock productivity and abundance is influenced by such changes. Stakeholders point to several concerns with regard to using B_{MSY}. Bernstein et al (2002) point to the importance of trying to distinguish and account for the relative impacts of fishing and environmental influences on abundance, and Marz and Stump (2002) point to the problem of the "shifting baseline" in calculating B_{MSY} in practice.

For GOA Pollock, the issue of changes in productivity and non-stationarity in parameters such as B_{MSY}, needs to be addressed explicitly. Pollock recruitment is highly variable, and pollock dynamics, especially in the GOA, is driven by the frequency of strong year classes (see Dorn et al, 2002, Figure 21). Pollock recruitment was low in the 1960s, high in the late 1970s and early 1980s, and has been episodic but generally since then. As noted below, these changes in recruitment appear to be unrelated to levels of spawning stock, and result in very large changes in stock size even in the absence of fishing.
(Recent CIE reviews of the fishery by Godo (2003) and Haddon (2003) also emphasize this feature). As noted above, B_{MSY} is inherently an equilibrium concept, and as far as pollock is concerned, the GOA is not an equilibrium system. All this implies that evaluation of the fishery against this scoring indicator is not straightforward.

The 2002 assessment for the GOA stock (Dorn et al, 2002) shows the population to be at 28% of unfished spawning biomass, or at 24% if the risk averse assumption is made that the 1999 year class is of only average abundance (the assessment suggests it is stronger, but uncertainty in the estimate of year class strength is high as it is not fully recruited to the fishery as yet). Both these levels (28% and 24%) are well below the B_{MSY} proxy of $B_{35\%}$, which is based in turn on average recruitment levels over the period from 1979 to 1999. On this analysis, the GOA stock would fail this scoring indicator (score less than 60). (The corresponding levels for the 2003 assessment are 31% and 27% of unfished levels (Dorn et al, 2003), still below the reference level, though indicating a partial recovery in the stock levels).

Noting the scientific evidence for regime shifts in the GOA, and also that there does not appear to be any relationship between spawning stock levels and subsequent recruitment for this stock (Dorn et al, 2002), the SCS evaluation team requested some further analyses from Martin Dorn (AFSC, Seattle – leader of the assessment team for GOA pollock), using the existing base case assessment model, to calculate the following:

1. Projections for stock size (3+ biomass and female spawning biomass) in the absence of fishing. These would be based on the assumption that the same recruitments would have occurred in the absence of fishing as have occurred with fishing taking place. These provide an alternative baseline time series for "unfished biomass".
2. A time series of relative depletion estimates for the GOA stock (biomass in a given year divided by unfished biomass in the same year, as calculated in 1 above).
3. A time series of exploitation rates for the GOA stock (catch divided by 3+ biomass).

Because of its importance to consideration of an appropriate evaluation against this scoring indicator, Martin Dorn's response to this request is included as Appendix 3 to this report. In brief, and allowing for the assumption that unfished biomass can be calculated in the manner suggested, the key results are as follows:

1. Stock size for GOA pollock would have varied almost tenfold since 1960, even in the absence of fishing (Figure 1, Appendix 3).
2. The declining trend in abundance since the early 1980s (Dorn et al, 2002) is also evident for the unfished stock (Figure 1, Appendix 3).
3. The lowest relative depletion level in the time series is 59% of the corresponding unfished level for 3+ biomass, and 44% of the unfished level for female spawning biomass (Table 1 and Figure 4, Appendix 3). Both are well above the $B_{35\%}$ proxy for B_{MSY}.
4. Exploitation rates for GOA Pollock have generally been low, although there is an overall increasing trend to the time series (Figure 3, Appendix 3), and a tendency to higher exploitation rates at lower stock sizes.

It is also interesting to note that the exploitation rate for GOA Pollock has been less than the exploitation rate for EBS (Eastern Bering Sea) Pollock in most years, although the latter is generally regarded as being in a healthier state, being at much higher stock size relative to average unfished levels (Ianelli et al, 2002). (However the comparison needs to be viewed with caution. The assumption of no relationship between spawning stock size and subsequent year class strength does not appear to hold as well for the EBS stock as it does for the GOA stock). Nevertheless, the poor status of GOA Pollock seems to be due to a long period of generally poor recruitment, rather than to exploitation rates having been too high.

Before discussing the relevance of these results to this scoring indicator, it is worth discussing the key assumption that recruitment would have been the same for an unexploited stock. Of course this is an assumption that can never be tested. However for GOA Pollock, it seems as though it may be a not unreasonable assumption, given the lack of a clear relationship between spawning stock size and subsequent recruitment (Dorn et al, 2002). Martin Dorn discusses this point in Appendix 3:

> "The depletion estimate obtained by taking the ratio of the model estimate of current biomass to virtual unfished biomass implicitly takes into account environmental trends that affect stock productivity. Both the conventional estimate of depletion and this new estimator do not take into account the indirect impacts of fishing due to changes in stock biomass (fewer recruits at low stock size, more cannibalism at high stock size). For example, the decline in mean recruitment in the 1980s and 1990s could be argued to be the result of lower spawning biomass, not environmental change. This line of argument is countered by noting that low stock sizes in the 1970s produced strong year classes, and that there isn't a clear pattern of declining recruitment in a plot of recruitment against spawning biomass. Many fisheries debates revolve around the relative importance of fishing versus the environment. Perhaps a stronger case can be made for the environment in this instance because harvest rates for GOA pollock have been demonstrably conservative for a gadid (Fig. 3)."

Allowing that much of the decline in the GOA stock over the past 20 years is environmentally driven puts a different emphasis on the exploitation history and current status of this stock. The results in Appendix 3 suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level relative to where it would have been now if the stock had never been fished is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these levels are well above the proxy $B_{35\%}$ level for B_{MSY} if the latter is viewed as a potentially dynamic quantity. If environmental variability is ignored and B_{MSY} is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below B_{MSY}, and the stock is overfished based on the standard suggested for this scoring indicator.

Dorn et al (2003) have updated the analysis described in Appendix 3 to include consideration of the impacts of spawning stock size on recruitment, as well as the (unknown) environmental drivers. Depending on the form assumed for the stock recruitment relationship, the estimates of spawning stock depletion in 2002 range between 40% and 46% of unfished levels. They conclude that "These results suggest that environmental variability is the most likely explanation for current low levels of stock abundance".

Which of these two views of stock status (relative to static or dynamic estimates of B_{MSY}) should the SCS evaluation team use to judge performance against this indicator? Neither is "correct" - they just represent different ways of viewing stock status. In considering this question, the evaluation team went back to their original rationale for choosing this indicator and selecting the reference level chosen (B_{MSY} bearing in mind that its proxy for pollock is $B_{35\%}$). The rationale stemmed in large part from concerns about the ecological impacts of low stock levels on predators of Pollock. The "intent" description for this scoring indicator refers both to this issue, and also to a need to take into account the effects of environmental variability. How might these two issues be reconciled?

There is strong evidence that the GOA ecosystem is highly variable and that this in turn impacts on population levels of individual species, and may also affect community structure (see discussion in preamble to Principle 2). The results in Appendix 3 and in Dorn et al (2003) suggest that this variability is an important feature of the dynamics of Pollock in the GOA, with population levels potentially fluctuating tenfold even in the absence of fishing. Although the system has only been observed through one of these cycles, it seems reasonable to suppose that such variability is a natural feature of this ecosystem. If so, then predators of species such as Pollock must also have had to cope with such variability in the past. They may well be adapted to such variability, and have a variety of mechanisms (such as prey switching) to deal with it. The results in Appendix 3
(Figure 1) suggest that fishing has served to accentuate rather than fundamentally change the nature of that variability. That in itself may be of concern – with a constant exploitation rate, the low points in the cycle would be lower with fishing than without it. On the other hand, the fact that stock level falls below an average $B_{35\%}$ level may not be of substantial concern, if such events are commonplace even in the absence of fishing. However it seems reasonable to suppose that there ought to be a "bottom line", a level below which it is undesirable for the stock to fall on the grounds of ecological impacts on the ecosystem, and hence below which exploitation should cease. Under the current GOA

harvest strategy for Pollock, that level is 20% of average unfished levels. Given the apparent level of natural variability in the stock, and the calculation that, even with a maximum exploitation rate of $F_{75\%}$ (i.e. a target stock size of $B_{75\%}$) the stock would still fall below $B_{35\%}$ almost 20% of the time (Martin Dorn, unpublished data), a 20% bottom line seems not unreasonable.

Based on all the complex arguments presented above, the SCS evaluation team concludes that the fishery fails to achieve a passing 80 score for this indicator, due to the current low level of absolute abundance and its possible wider ecological impacts (especially for predators). However the evaluation team takes note of the possibility that much of the decline in abundance may be due to environmental factors, and that the stock appears in general to have been responsibly managed as far as exploitation rates are concerned. The team is therefore of the view that the score for this indicator does not fall below the 60 scoring level.

Two responses to the evaluation of this indicator in the draft evaluation report are worth recording here. Marz (2003) states:

> "We strongly disagree with the team's analysis under this PI. The GOA stock should fall below the 60 SG level because its abundance estimates are dangerously low and below MSY. Your analysis involves gross speculation. The issue is not whether variability is a natural feature of the ecosystem, but how much has fishing changed the nature of that variability. This is impossible to assess definitively. As such, it is imperative to manage the fisheries in as precautionary a manner as possible regardless of what has caused the low stock size. This involves lowering TAC levels, if fishing is permitted at all. However, the Council recently *increased* the harvest level 31 percent despite the fact the GOA pollock biomass is low and below MSY. Further, relying on the strength of the 1999 year class is dangerous as many of the assumptions in calculating the stock estimate may be overestimated. Given the low biomass estimate, it would be more precautionary to leave more of the 1999 year class in the water to mature and grow.
>
> As noted by Dayton et al. (2000), without reliable baseline data to compare the current state of the ecosystem to an unfished environment, the causes of ecosystem changes in a complex system can always be argued. Undoubtedly environmental forces play a large (though not well understood) role in determining the population dynamics of fish species, particularly on a year-to-year basis in a variable high- latitude marine environment, as do ecological interactions between species in the marine food web. But it must be said that no theory of "regime shifts" has shown an effect on any fish population as profound as that which is *assumed* in the stock assessment models and theory of MSY, which approximately doubles the estimated annual mortality on stocks such as pollock, by design (Field 2002)."

In response to several of the points raised by Marz, it seems to the evaluation team that Dorn's analyses do in fact address (if not definitively, but that is never possible) the extent to which fishing has changed the nature and extent of the natural variability in

abundance. The recommended increase in the TAC levels reflects a more optimistic assessment, and discounts (rather than relying on) the strength of the 1999 year class. The increase comes about from proper application of the existing harvest strategy. It has already been noted that this has not been demonstrated to be robust to the type of variability in productivity evident in GOA pollock, but the condition at indicator 1.1.1.5
is designed to address this issue directly (and result in a more conservative harvest strategy if the evaluations indicate that is called for).

Pope (2003), one of the external reviewers of the report, made the following comment with regard to this scoring indicator:

> "The assessment team clearly had problems with this indicator. Personally I would prefer it to refer to the limit reference point as specified by the tier rules rather than at an absolute level. Whether the tier rules (or for that matter B_{msy} based rules) are precautionary will be decided under the condition to 1.1.1.5. Similarly I would exclude predators' needs here but deal with them robustly in the appropriate place. This interpretation would lead to a passing score here. However, using the scoring guideposts as written I think the assessment team is correct to give no more than 70. Indeed the wording of 60 might suggest a still lower score but I think this might be unjust. The problem here underlines the difficulty of biomass limits with stocks subject to large natural fluctuations. The conditions specified seem reasonable."

Mindful of these views, and of the additional assessment reported in Dorn et al (2003), the SCS evaluation team stands by its original scoring for this indicator.

Condition

1. The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of Pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation. **Specifically, the testing of alternative harvest strategies should evaluate whether the criterion that the stock should remain above the static version of $B_{20\%}$ provides sufficient protection for predators of Pollock.**
2. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn et al (2003) in relation to the relative impacts of fishing on recruitment variability and stock abundance.
3. The GOA plan team should recommend strategies to improve the reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to better understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).