The Bering Sea and Aleutian Islands Freezer/Longline Pacific Cod Fishery

Final Assessment Report

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MSC TAB Directives (All)
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Amendments Issued Since Original Draft

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1	14 November 2005	Draft Report for Client Review
2	22 November 2005	Draft Report for Peer Review
	11 December 2005	Draft Report for Public Comment
3	14 January 2006	Final Report after Public Comment Period
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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" or "sustainable" fisheries, the MSC initiative intends to identify such fisheries through means of independent third-party assessments and certification. Once certified, fisheries will be awarded the opportunity to utilize an MSC promoted eco-label to gain economic advantages in the marketplace. Through certification and eco-labelling, the MSC intends to promote and encourage better management of world fisheries, many of which have been suggested to suffer from poor management.

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 Fisheries Certification standard was issued in 1998, and has since been used as the basis by which fisheries are evaluated under the MSC program.

1.1 THE FISHERY PROPOSED FOR ASSESSMENT

The fishery evaluated in this report is:

Species:	*Gadus macrocephalus*
Geographic Area:	Bering Sea and Aleutian Islands
Fishing Method:	Longline
Fishery Management:	National Marine Fisheries Service, North Pacific Fisheries Management Council
Scope of Assessment:	Bering Sea and Aleutian Islands freezer/longline Pacific cod fishery

2 PACIFIC COD

A brief description of Pacific Cod and the associated fishery assessed in this project are 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 8, Assessment Team Performance Evaluations. Also, most everything a reader needs to know in general about the fishery can be found in the current (and past) stock assessment reports issued by the U.S. Department of Commerce, National Marine Fisheries Service each year.

2.1 Pacific Cod

2.1.1 The Target Species

Thompson et al. (2005) provide the following summary of the target species and target fishery:

"Pacific cod *(Gadus macrocephalu*s) is a transoceanic species, occurring at depths from shoreline to 500 m. The southern limit of the species' distribution is about 34° N latitude, with a northern limit of about 63° N latitude. Pacific cod is distributed widely over the eastern Bering Sea (EBS) as well as in the Aleutian Islands (AI) area. The resource in these two areas (BSAI) is managed as a single unit. Tagging studies (e.g., Shimada and Kimura 1994) have demonstrated significant migration both within and between the EBS, AI, and Gulf of Alaska (GOA), and genetic studies (e.g., Grant et al. 1987) have failed to show significant evidence of stock structure within these areas. Pacific cod is not known to exhibit any special life history characteristics that would require it to be assessed or managed differently from other groundfish stocks in the EBS or AI areas."

2.1.2 Life History Features of Pacific Cod

2.1.2.1 Systematics

The systematics of the Pacific Cod (*Gadus macrocephalus*) is still debated by fishery taxonomists. Some scientists consider the Pacific cod to be subspecies of the Atlantic cod, *Gadus morhua*, while others consider it to be a separate species (Ketchen, 1961). The North American literature generally considers the Pacific cod to be a separate species of *Gadus*, but many Soviet investigators consider it to be the same species as is fished in the North Atlantic.

2.1.2.2 Distribution and Behavior

The Pacific cod is a transoceanic species occurring form near shore out to depths of about 500 meters. It is known to occur from California (about 34° N) to well north (63° N) in the Bering Sea, west along the Aleutians and south along the Asian coast to northern Japan (NMFS, 2003). Although these ranges identify the geographic distribution of the species in the North

Pacific Ocean, commercial concentrations in the Northeast Pacific are more restricted and target fisheries are known to occur from northern Washington State north to the Bering Sea.

2.1.2.3 General Ecology

A great deal of the relevant data on the ecology of the Pacific cod is concerned with its behavior in the waters of northern Washington State and British Columbia (Ketchin, 1961, and Alverson et al. 1964). Both the above authors note that Pacific cod in the more southern portion of its range have rather distinct seasonal bathymetric migrations, moving from the shallower portions of their depth distribution during the summer months to deeper waters during the winter months. It is suspected that similar bathymetric movements occur in the Bering Sea and along the Aleutian Islands. These migrations influence the seasonal distribution of fishing activities within the Northeast Pacific Ocean. The bathymetric migrations appear to be confined to the continental shelf, ranging between about 55 and 150 meters. Similar depth migrations are reported in the Western Pacific, but apparently too much greater depths. Mossiev (1953) Waldron (1981) and Kendal and Dun (1985) have described the seasonal species distribution of larval Pacific cod in the Eastern Bering Sea, as well as, around Kodiak Island in the GOA. The young can be scattered widely over the continental shelf but generally appear to prevail at somewhat shallower depths than adults. Some spawning may occur throughout the year, although it would appear that the majority of ripe and spawning fish occur during the spring months.

2.1.2.4 Feeding

The feeding patterns of Pacific cod in the Bering Sea area are well documented and, depending upon age, can include zooplankton, various invertebrates, including many species of commercial crabs, forage fish, pollock, etc. The Pacific cod appear to opportunistic feeding on a wide range of benthic and pelagic forage species (NMFS, 2003).

2.1.2.5 Genetics

A number of studies including morphormetric evaluations have been conducted to examine the Pacific cod population structure, but perhaps the most reliable genetic information comes from the studies using electrophoretically detectable proteins undertaken by Grant et al., (1986). These authors found two distinct populations of Pacific cod in the North Pacific, one in the Western North Pacific and one in the Eastern North Pacific. The populations inhabiting the BSAI and GOA are considered to have the same genetic structure and are part of the Eastern North Pacific stock.

2.1.2.6 Growth

Pacific cod in the Bering Sea are known to grow rather rapidly and reach an average length of 19 cm at age 1 and may exceed 89 cm at age 12. The stocks are generally exploited from age 3 on. The distribution of Pacific cod lengths (midyear) is shown in Figure 1. At age 1 the Pacific cod may very in length from 9 to 27 cm and age two fish from 18 to 45 cm. By age 12 the noted size range is from 65 to 105 cm. A relatively small fraction of the Bering Sea Pacific cod begins to mature at 2, but the vast majority of females mature between ages 3 and 6 (NMFS, 2003).

Figure 1. .Distribution of Pacific cod lengths (cm) at age (mid-year) as defined by final parameter estimates. Lengths correspond to lower bounds of size bins. Columns sum to 1.0. Source: NPFMC.

Len.	Age Group											
	1	2	3	4	5	6	7	8	9	10	11	12+
105	0	0	0	0	0	0	0	0.001	0.006	0.020	0.046	0.167
100	0	0	0	0	0	0	0.001	0.007	0.030	0.068	0.114	0.179
95	0	0	0	0	0	0	0.007	0.040	0.103	0.170	0.221	0.224
90	0	0	0	0	0	0.004	0.041	0.129	0.217	0.264	0.271	0.202
85	0	0	0	0	0.001	0.029	0.137	0.248	0.281	0.254	0.209	0.134
80	0	0	0	0	0.010	0.116	0.262	0.283	0.221	0.152	0.102	0.064
75	0	0	0	0.001	0.063	0.254	0.288	0.192	0.106	0.056	0.031	0.022
70	0	0	0	0.012	0.198	0.306	0.182	0.077	0.031	0.013	0.006	0.006
65	0	0	0	0.079	0.321	0.202	0.066	0.019	0.006	0.002	0.001	0.001
60	0	0	0.004	0.243	0.266	0.073	0.014	0.003	0.001	0	0	0
55	0	0	0.046	0.349	0.113	0.014	0.002	0	0	0	0	0
50	0	0	0.210	0.233	0.025	0.002	0	0	0	0	0	0
45	0	0.003	0.380	0.072	0.003	0	0	0	0	0	0	0
42	0	0.019	0.191	0.009	0	0	0	0	0	0	0	0
39	0	0.072	0.109	0.002	0	0	0	0	0	0	0	0
36	0	0.172	0.044	0	0	0	0	0	0	0	0	0
33	0	0.261	0.013	0	0	0	0	0	0	0	0	0
30	0	0.248	0.003	0	0	0	0	0	0	0	0	0
27	0.002	0.150	0	0	0	0	0	0	0	0	0	0
24	0.016	0.057	0	0	0	0	0	0	0	0	0	0
21	0.088	0.014	0	0	0	0	0	0	0	0	0	0
18	0.238	0.002	0	0	0	0	0	0	0	0	0	0
15	0.329	0	0	0	0	0	0	0	0	0	0	0
12	0.230	0	0	0	0	0	0	0	0	0	0	0
9	0.098	0	0	0	0	0	0	0	0	0	0	0

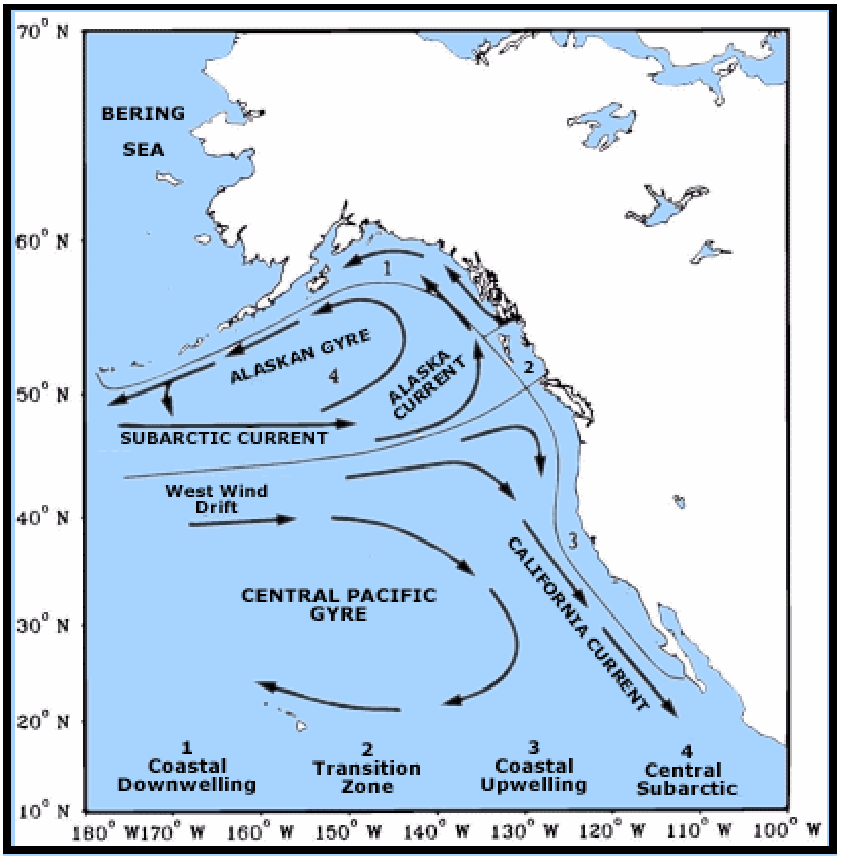
2.2 OVERVIEW OF THE PACIFIC COD FISHERY

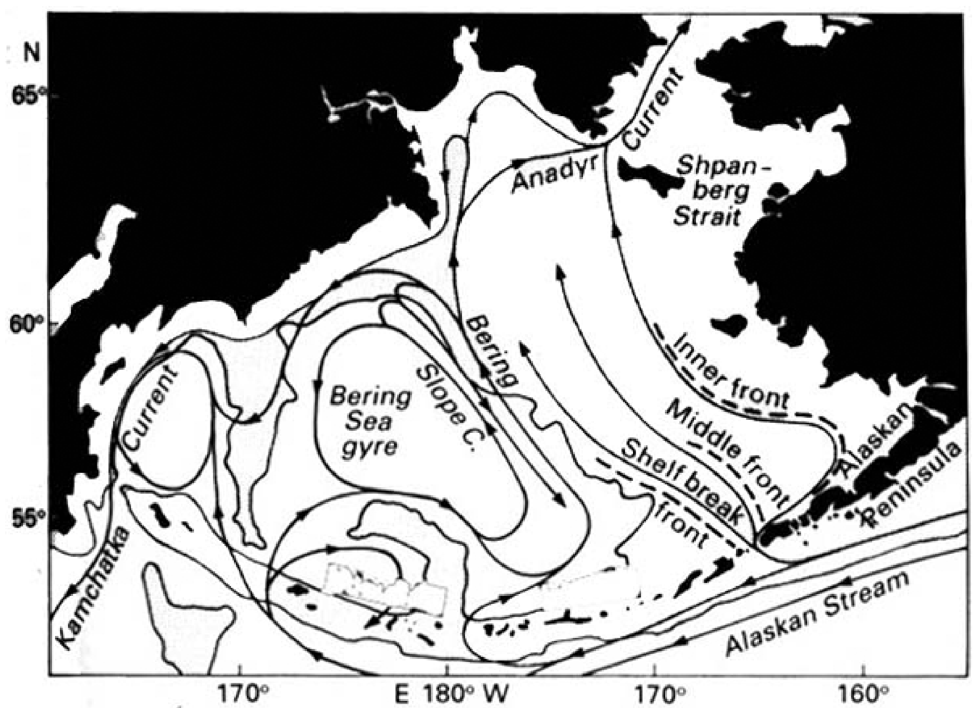
2.2.1 General Area of the Fishery

The Bering Sea is one of the bordering seas of the Pacific basin and is shaped like a semi-circle (Mathisen and Coyle, 1996). The Sea washes the coast of North America in the east and northeast and the coast of Asia in the west and northwest. The Aleutian-Commander Archipelago borders the Bering Sea to the south, separating it from the Pacific Ocean. The Bering Sea is connected with the Chuckchi Sea and the Arctic Ocean through the Bering Strait. The Bering Sea is often divided into distinct zones based on bottom relief such as the shelf and island region, the continental slope, and deep basins. The shelf area, with a depth up to 200 meters, lies mainly in the eastern and northeastern portions of the Bering Sea and occupies more than 40% of the total area.

Dodimead et al., (1963) described the physical oceanography of the region in detail. Surface and waters down to about 200 m flow easterly across the Pacific Ocean into the southern GOA and then swing counterclockwise through the central GOA and westerly along the Aleutian Islands (Figure 2). The wind-driven surface currents may break through the Aleutians and move northward into the Bering Sea, while the deep water moves on to the west entering the Bering Sea and the western extremities of the Aleutian Island chain. The biological productivity of the BSAI is dependent upon the year-to-year variability in this current system, wind mixing and changing ice patterns.

Figure 2. Diagrams of ocean currents in the northeast Pacific Ocean and the Bering Sea. Source: NRC.


BERING
SEA
ALASKAN GYRE
4
ALASKA CURRENT
SUBARCTIC CURRENT
West Wind Drift
CENTRAL PACIFIC GYRE
CALIFORNIA CURRENT
1
2
3
1 Coastal Downwelling
2 Transition Zone
3 Coastal Upwelling
4 Central Subarctic
70° N
60° N
50° N
40° N
30° N
20° N
10° N
180° W
170° W
160° W
150° W
140° W
130° W
120° W
110° W
100° W


N
65°
60°
55°
Anadyr
Current
Shpan-berg Strait
Bering
Slope C.
Bering Sea gyre
Current
Kamchatka
Inner front
Middle front
Shelf break front
Alaskan Peninsula
Alaskan Stream
170°
E 180° W
170°
160°

2.2.2 Fishery Background

Prior to the extension of national jurisdiction over the fisheries, U.S. and Canadian fishers harvested mainly salmon, herring, crabs and halibut from the Bering Sea region. In the post World War II period, the region was fished intensively by the Japanese for various bottom fish species and later by other foreign vessels. In the 1950s and 1960s, large-scale trawling by foreign fishing vessels occurred throughout the Bering Sea targeting mainly Pacific Ocean perch, flounders and Pacific cod. Pacific Ocean perch, and yellowfin sole stocks were apparently overfished, resulting in a collapse of some stocks that are currently being or have been rebuilt. Following passage of the MFCMA in 1976, foreign fisheries in the BSAI and GOA were rapidly phased out after a short joint venture period where U.S. vessel harvested the fish and supplied foreign processors.

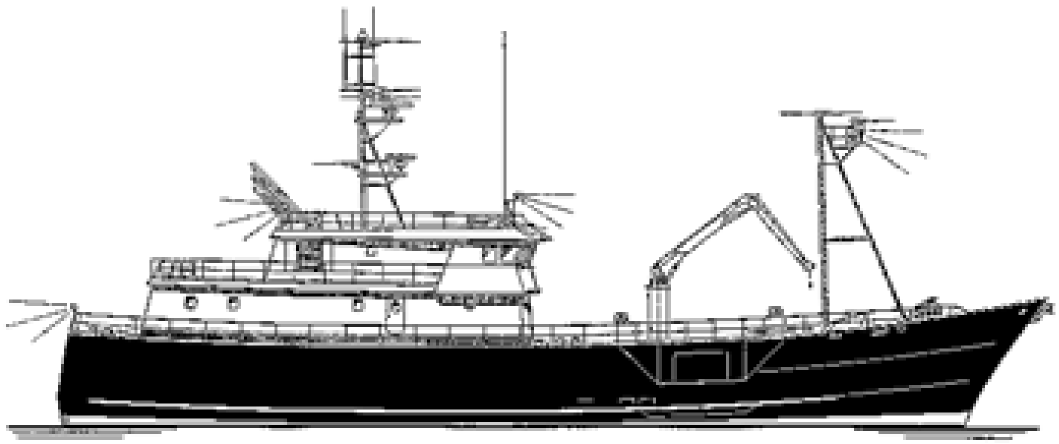
The U.S. BCF undertook extensive trawl surveys in the GOA and EBSAI during the 1950s and 1960s (see Alverson et al., 1964). The NMFS conducts annual intensive trawl surveys throughout most of the southeastern Bering Sea and augments these with less intensive longline, pot and hydroacoustic surveys for stock assessment purposes. The Pacific cod fisheries of the BSAI are operated under observer monitoring and NMFS/Coast Guard enforcement programs similar to those described for other eastern Bering Sea fisheries.

Although the Japanese are known to have taken considerable quantities of Pacific cod in their BSAI trawl fisheries conducted in the 1950s, directed line fishing in the area did not begin until the 1960s. Development of a significant U.S. presence in the bottom fish fishery in the region did not occur until after the passage of the 1976 FCMA. Small catches of Pacific cod were traditional taken by local shorebased commercial boats prior to this period, but they were insignificant (less than 100 metric tons per year) until 1980, when U.S. joint venture and land based catches soared to over 10,000 metric tons. In 1981, U.S. trawl catches of Pacific cod began to increase rapidly and by 1983 exceeded 45,000 metric tons, exceeding previous annual foreign catches. However, the U.S. line fishery catches from the BSAI area remained low and did not exceed 100 metric tons until the 1986. Following 1986, U.S. longline catches increased sharply and the line fishery became the dominant harvesting component of the Pacific cod fishery during the 1990s. Pot and jig fisheries also target Pacific cod in the area.

2.2.3 Fishing Vessels, Gear and Operational Mode

The line fishery for Pacific cod, including the portion under review for certification, is currently conducted with stationary lines onto which baited hooks are attached by gangions. Vessels participating in the line fishery include small to medium-sized catcher vessels ranging up to about 23 m (75 feet) in length, along with catcher processors, which range from 27 to 61 m (90 to 200 feet) in length (Figure 3). The fleet under consideration for certification includes only the catcher freezer processors, of which 39 are currently active. The components of the gear fished by these vessels that come in contact with the seabed include anchors, groundlines, gangions and hooks. The freezer processors use two-pronged standard anchors, which weigh about 27 kg (60 pounds) and the longlines are constructed of 9 mm diameter ground lines with 25 to 36 cm (10 to 14 inch) gangions spaced about 1 m (3.5 feet) apart. Most vessels use No. 6 to 14 modified J hooks or full circle hooks.

Figure 3. An example of a BSAI Pacific cod freezer longliner. Source: MARCO.

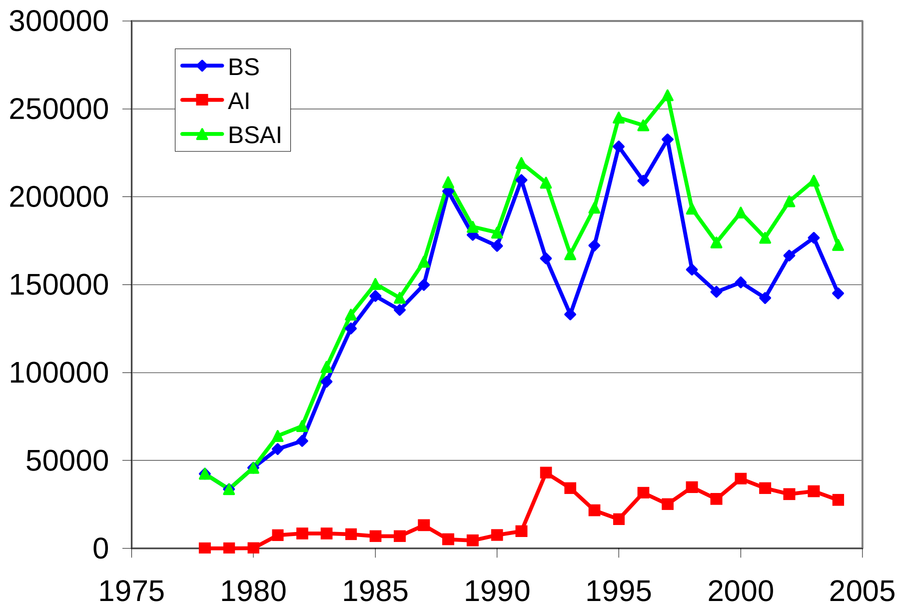


Freezer longline gear is normally set using automatic baiting equipment, which adds tension to the groundlines, thus minimizing the movement of the lines on the seafloor. Vessels retrieve gear from the seafloor by picking up one end, which is attached to a buoy, and moving the vessel along the line of the gear. This results in pulling the gear upwards, rather than along the seafloor. It is not possible to drag longline gear along the seafloor since it does not have the tensile strength to resist breaking, given the length of line deployed.. Usually the gear is set in a straight line with the average set being about 15 km (8 nautical miles) long. On average such a set would deploy about 20,000 hooks at depths from 50 to 90 fathoms. Frequently, two sets are made in parallel about 1 to 1.5 km (0.5 to 0.75 nautical miles) apart. Soaking time for the gear may range from 4 to 20 hours. Anchors are set at each end of the longline set and occasionally an anchor is set at the mid point of a set. Some vessels use intermediate weights ranging from 1 to 4 kg (3 to 10 pounds).

2.2.4 Catch History

The recent catch history for Pacific cod fishing in the eastern Bering Sea is shown in Figure 4. The total Pacific cod catch taken from the eastern Bering Sea peaked in 1997 when well over 200 thousand metric tons where reported to have been taken. The catches during the post WWII years was at the onset dominated by foreign trawlers, subsequently by U.S. trawl fishers and finally in the mid 1990s by U.S. line vessels. Records for the foreign line catches are provided only back to 1978, although, the fishery is known to have occurred in the mid 1960s. The foreign line fisheries dominated Pacific cod fishing in the eastern Bering Sea until 1982 when the U.S. trawl joint venture and domestic trawl catch exceeded the foreign harvest. U.S. line fishers operating out of Alaska and the Pacific Northwest began to increase rapidly during the late 1980s and skyrocketed during the 1990s. Since the 2000s, the line fishery has been more than doubled the reported trawl catch. The trends in participation and Pacific cod catch between the two dominant U.S. gear types, trawl and longlines, have been influenced by market acceptance, vessel availability and other economic factors. However, the major basis for the differences in catches has been based on allocation polices of the North Pacific Fisheries Management Council (NPFMC).

Figure 4. Catches of Pacific Cod



Although the freezer–processors in recent years have taken a significant portion of the total Pacific cod taken from the BSAI, all three gear types play important roles in the Pacific cod harvest.

The total acceptable biological catch (ABCs), total allowable catch (TACs) and actual catch of Pacific cod for the BSAI areas, along with the stock assessment model used are shown in Figure 5. The TAC's have ranged between 70 and 270 thousand metric tons, generally increasing as the quality of the data on the resources has improved. Catches for most years are below the TAC's and for all but three years, well below the ABC. Nevertheless, there are a few years late 1980s through mid-1990s during which the catch exceeded the established ABCs and TAC's.

Figure 5. History of Pacific cod ABC, TAC, total BSAI catch, and type of stock assessment model used to recommend ABC. Catch for 2003 is current through September. Source: NPFMC.

Year	ABC	TAC	Catch	Stock Assessment Model
1980	148,000	70,700	45,947	projection of 1979 survey numbers at age
1981	160,000	78,700	63,941	projection of 1979 survey numbers at age
1982	168,000	78,700	69,501	projection of 1979 survey numbers at age
1983	298,200	120,000	103,231	projection of 1979 survey numbers at age
1984	291,300	210,000	133,084	projection of 1979 survey numbers at age
1985	347,400	220,000	150,384	projection of 1979-1985 survey numbers at age
1986	249,300	229,000	142,511	separable age-structured model
1987	400,000	280,000	163,110	separable age-structured model
1988	385,300	200,000	208,236	separable age-structured model
1989	370,600	230,681	182,865	separable age-structured model
1990	417,000	227,000	179,608	separable age-structured model
1991	229,000	229,000	219,266	separable age-structured model
1992	182,000	182,000	208,046	age-structured Synthesis model
1993	164,500	164,500	167,389	length-structured Synthesis model
1994	191,000	191,000	193,802	length-structured Synthesis model
1995	328,000	250,000	245,029	length-structured Synthesis model
1996	305,000	270,000	240,673	length-structured Synthesis model
1997	306,000	270,000	257,762	length-structured Synthesis model
1998	210,000	210,000	193,253	length-structured Synthesis model
1999	177,000	177,000	173,995	length-structured Synthesis model
2000	193,000	193,000	191,056	length-structured Synthesis model
2001	188,000	188,000	176,659	length-structured Synthesis model
2002	223,000	200,000	197,352	length-structured Synthesis model
2003	223,000	207,500	171,354	length-structured Synthesis model

2.2.5 Bycatch

The discards in the Pacific cod line fisheries in the BSAI has varied over time and in 1992 were reported as about 22% (including halibut). The reported catch and discard since 1997, has ranged between 12 and 20%. The composition of the discards reported for the years 1997 to 2002 is given in Figure 6. Skates dominate the freezer-longline fishery discards and in 2002 over 17 thousand metric tons were caught and discarded. The catch of skates has risen steadily since 1999. This may reflect increase abundance of skates or changing fishing patterns of the line fleet. Note the above tables of discards do not include the halibut discards, which are regulated under an allowable bycatch cap.

Figure 6. Bycatch of nontarget and “other” species taken in the EBS Pacific cod longline fishery.

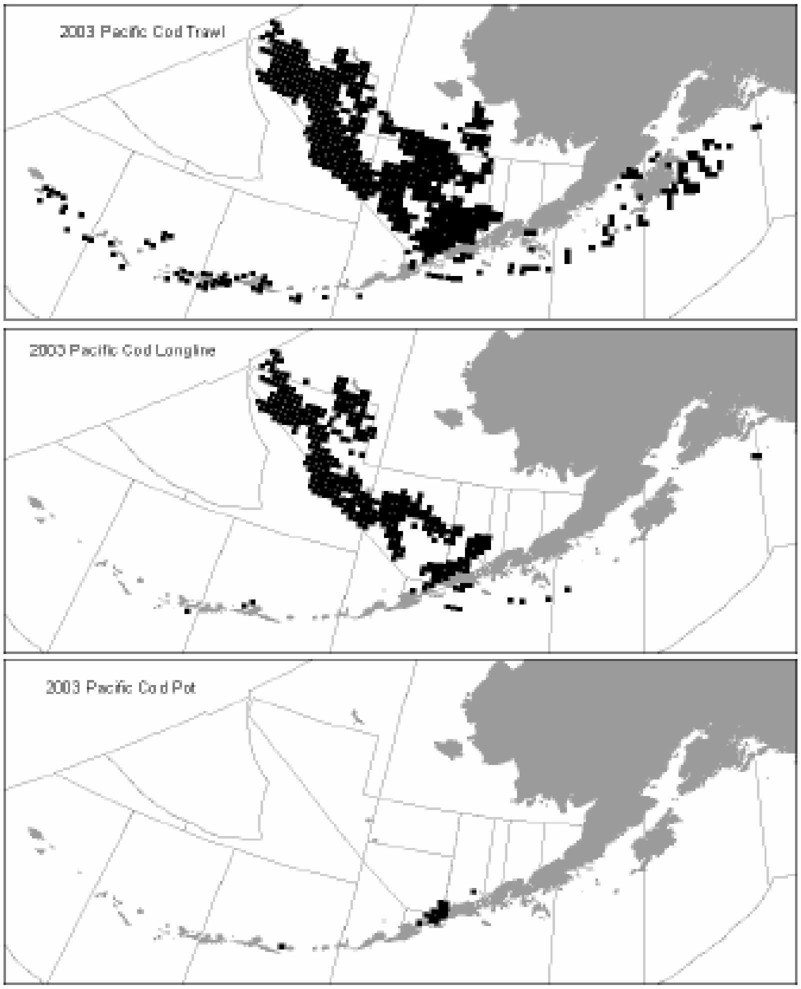
	Bycatch in EBS Pacific cod longline fishery						Proportion of total EBS catch					
Species	1997	1998	1999	2000	2001	2002	1997	1998	1999	2000	2001	2002
sculpin	706	931	821	801	1,142	1,383	0.11	0.18	0.18	0.14	0.19	0.18
skates	12,961	12,808	9,178	11,578	11,932	17,507	0.77	0.70	0.69	0.68	0.66	0.66
shark	27	48	18	47	17	22	0.50	0.40	0.11	0.78	0.70	0.48
salmonshk	0	1	1	0	1	10	0.00	0.05	0.04	0.01	0.05	0.22
dogfish	4	5	5	8	11	8	1.00	0.90	0.99	0.98	0.83	0.92
sleepershk	67	114	99	114	240	250	0.24	0.34	0.35	0.33	0.37	0.30
octopus	15	15	13	29	15	76	0.07	0.10	0.10	0.08	0.08	0.19
squid	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
smelts	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
gunnel	0	0	0	0	0	0		0.60	0.00	0.80	0.00	0.00
sticheidae	0	0	0	0	0	0	0.01	0.00	0.00	0.00	0.00	0.56
sandfish	0	0	0	0	0	0	0.00	0.00	0.01	0.00	0.00	0.00
lanternfish	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
sandlance	0	0	0	0	0	0	0.00		0.00	0.00	0.00	0.00
grenadier	437	604	356	364	162	336	0.15	0.12	0.08	0.09	0.07	0.06
otherfish	43	27	38	38	71	122	0.03	0.03	0.04	0.03	0.06	0.11
crabs	1	0	0	1	1	3	0.00	0.00	0.00	0.00	0.01	0.01
starfish	136	141	250	132	319	384	0.02	0.04	0.08	0.04	0.08	0.08
jellyfish	5	7	24	2	2	5	0.00	0.00	0.00	0.00	0.00	0.00
invertunid	10	12	1	6	10	11	0.01	0.02	0.01	0.01	0.01	0.01
seapen/whip	2	2	4	3	6	41	0.83	0.79	0.87	0.63	0.79	0.95
sponge	1	1	2	1	0	5	0.00	0.00	0.01	0.01	0.00	0.03
anemone	76	58	123	200	115	195	0.42	0.51	0.73	0.58	0.55	0.59
tunicate	1	1	0	2	0	1	0.00	0.00	0.00	0.00	0.00	0.00
benthinv	7	5	10	11	12	12	0.01	0.01	0.04	0.03	0.02	0.03
snails	0	0	0	0	0	0					1.00	0.00
echinoderm	1	0	3	0	0	0	0.02	0.00	0.11	0.00	0.00	0.01
coral	1	0	0	3	1	2	0.07	0.02	0.04	0.30	0.01	0.03
shrimp	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
birds	26	33	17	24	13	13	0.98	0.86	0.81	0.97	0.88	0.96

The first part of the table ("Bycatch in…") shows the amount (metric tons or individuals, as appropriate) of each species group taken as bycatch in the EBS Pacific cod longline fishery, broken down by year. The second part of the table ("Proportion of…") shows the same quantity expressed relative to the total EBS catch (taken in all target categories with all gears) of that species group in that year. An empty cell in the second part of the table indicates that no catch of that group was observed in the EBS during that year. Source: NPFMC.

2.2.6 Distribution of Line Fishing and Intensity of Fishing

Fishing effort in the line fishery of the eastern Bering Sea is generally concentrated along the outer edge of the continental shelf while the trawl Pacific cod fishery tends to be spread out over much of the eastern Bering Sea shelf (Figure 7). The smaller pot and jig fishery is mostly fished close inshore near the Aleutian Islands.

Figure 7. Catch Distribution of Pacific Cod



From Thompson and Dorn 2004 figure 2.1. [To create this figure, the EEZ off Alaska was divided into 20 km × 20 km squares. A square is shaded if more than two hauls containing Pacific cod were sampled in it during 2003.]

The eastern Bering Sea Pacific cod line fishery takes place at relatively low levels of effort considering the size of the area where fishing takes place. For the 1990-2002 periods, the line effort is reported to be fewer than 19 sets per 25 square kilometer NMFS statistical fishing area. A comparable number for the Aleutian Islands area is 25 sets per 25 square kilometer statistical area. It should be noted that the shelf and slope area of the eastern Bering Sea is reported to be 72,898 square kilometers but the area within the NMFS statistical fishing grids is only 94,775 square kilometers. Thus, the actual density of fishing on the overall available shelf and slope is substantially less than from the set rates noted above, which are limited to the NMFS statistical grids.

3 FISHERIES MANAGEMENT SYSTEM

3.1 THE MAGNUSON FISHERY CONSERVATION AND MANAGEMENT ACT AND CONTENTS

The Magnuson Fishery Conservation and Management Act (MFCMA) was approved by the U.S. Congress in 1976 and was implemented in the following year. This Act, in part, established exclusive U.S. federal authority to manage fishery resources between three and two hundred nautical miles (5.5 to 370.4 km) from the shoreline. In order to manage the fisheries off various states, the U.S. government established eight federal Councils around the U.S. including Alaska and Hawaii. The Act gave the Secretary of Commerce ultimate responsibility of overseeing the Councils' recommendations for fisheries management. The NMFS acts as the representative of the Secretary of Commerce in recommending to the Secretary of Commerce the approval or denial of regulations proposed by the Councils. The NMFS receives and evaluates recommendations from the Councils, reviews the proposed regulations and along with the U.S. Coast Guard, enforces fishery regulations on a day-to-day basis. NMFS fisheries managers are located in the Alaska Regional Office in Juneau, Alaska. 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, a research division that conducts stock assessment of the Exclusive Economic Zone (EEZ) fishery resource and a federal observer data repository. .

The policies, which guide the management of the Alaska Pacific cod fishery, are derived from the MFCMA, 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 action, 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 over fishing while achieving on a continuing basis the optimum yield (OY) from each fishery for the U.S. 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 residences 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 of 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 Act, however, in recent years, the Act (1996) has been amended to require specific management actions to be taken consistent with the "precautionary principle." Objectives for the management of the Pacific cod fisheries within the BSAI are outlined in the Fishery Management Plans (FMPs) for these two areas. Note the goals and objectives for ground fisheries within the eastern Bering Sea are basically the same as it relates to conservation matters.

The management objectives include specific commitments (among others) to:
(1) minimize the chances of irreversible or long-term adverse effects on fishery resources and the marine environment, (2) establish annual guidelines, with biological constraints for each ground fishery and mix of species taken in that fishery, (3) account for all fishery related removals by all gear types for each groundfish species, sport fishery and subsistence catches, as well as, directed fisheries, (4) develop management measures that encourage the use of gear and fishing techniques that minimize discards, and (5) to establish population thresholds for economically viable species complexes on the basis of the best scientific information available and acceptable biological limits on harvest will be set as established in the plan document.

3.2 MODIFICATIONS TO ACT

Over the past two years, all FMPs are (or have been) amended to revise overfishing definitions to comply with the Sustainable Fisheries Act (1996). The amended Act is interpreted as being consistent with the precautionary approach, a framework for ensuring that conservation objectives take precedence over short-term economic goals. The Act, for example, dictates that management needs to maintain the abundance of stocks at levels capable of producing the Long Term Potential Yield (LTPY) or maximum sustainable yield (MSY). Current polices demand conservation actions occur prior to catches reaching the MSY level. Other modifications to the Act call for protection measures for essential fish habitat and measures to increase retention and use of bycatch.

3.3 CONTEMPORARY MANAGEMENT

The current management of the Pacific cod 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 set limits on the harvest level 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. 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 quotas for the Pacific cod fishery in the BSAI are set annually along with time/area restrictions of the fisheries. The establishing of quotas results from recommendations submitted to the Council by the scientific staff of the NMFS based on the results of comprehensive stock assessment surveys and observer collection of harvest data. The NMFS scientists' recommendations are reviewed by the Council's Scientific and Statistical Committee composed of peer review scientists and the Advisory Panel composed of stakeholders. Their recommendations are passed (at times with suggested changes) to the Council for consideration and the final setting of TACs, prohibited species bycatch limits, and time/area closures for protection of species of concern. Public debate and discussions of the recommendations take place at Council meetings along with consideration of written commentary. For all but four years over the past two decades, catches of Pacific cod have been less than established TAC's. However, in four years the catch slightly exceeded the established quota.

Allocation of resources, such as Pacific cod, between gear types is also recommended by the NPFMC, and allocations may represent biological, economic and/or social factors, but also may be driven by the political constituents who make up the fisheries of the region.

3.4 EVALUATION OF STATUS OF STOCK

The status of the BSAI Pacific cod stocks has been followed closely over the past two decades and some quantitative data is available for early periods when foreign trawlers and longliners largely exploited the fishery. There is some question of the consequences of changing stock assessment methodology over the past 24 years. Early assessments (1980 to 1984) relied on projections of 1970 survey numbers at age, while in 1985 the ABC and TAC estimates were based on 1970 and 1985 survey data. In 1986, the status of stocks was evaluated using a "separable age –structured model" and this method was continued until 1991. In 1992, an "age structured synthesis model was used and from 1993 on ward a length–structured synthesis model was employed. Thus, five different models were utilized over a period of 24 years. Note that the ABC increased rather steadily until the late 1980s, remaining relatively high (around 400 thousand metric tons) until the beginning of the next decade and then declined to a low in 1999. The Pacific cod ABCs shifted upwards during the first four years of the new century. These shifts in ABC have followed changes in abundance of BSAI Pacific cod stocks and consideration of the precautionary principle.

The population of Pacific cod increased rapidly during the late 1970s and through much of the 1980s due to a series of particularly strong year classes with a peak in abundance occurring during the late 1980s. Following the very high levels of abundance noted in the late 1980s, the biomass declined through the 1990s until 1998 and then remained steady, increasing somewhat from since 2001. For 16 of the 24 years for which data are available, the TAC was less than the projected ABC, while during eight of the years they were equal. This suggests some variation in the Council's application of its conservative polices. However, for all years when the stock was at relative high levels of abundance, the actual catch was less than the TAC and for most years the catch was considerably less than the noted ABC. It is difficult to differentiate the factors impacting biomass trends, however, it would appear that recruitment patterns and fishing have both played a role in stock abundance. The increase in recruitment in recent years, suggests the stock condition is improving.

4 PROCESSING AND TRANSHIPMENT

For the Bering Sea and Aleutian Islands Freezer Longline Pacific cod fishery, all landings are recorded and reported. Compliance in the fishery is monitored and enforced by the NMFS Alaska region.

Processing occurs on board freezer/longline vessels. Fishery observers are present during a high percentage of fishing to assure proper reporting of catch, bycatch, and other parameters. Any processing of additional Pacific cod, other than that landed directly by a vessel, is automatically recorded.

This assessment report does not cover transshipments or processing beyond the point of landing the fish on the deck of a vessel and preparing it for processing. This report acknowledges that sufficient monitoring takes place to identify the fishery of origin for all landed Pacific cod and that there is sufficient information to allow an MSC Chain of Custody to be established from the point of landing forward for all products derived from the fishery. MSC chain of custody certifications were not undertaken in this project, and therefore, need to be undertaken on a separate and individual basis for those entities that may wish to identify and/or label products derived from the fishery.

It is important to remember that this assessment only covers that portion of the Pacific cod fishery that is fished by freezer longline vessels. Any landings put into the market through vessels not covered under this assessment or through deliveries to shoreside processors are not part of this assessment.

5 THE ASSESSMENT PROCESS

Scientific Certification Systems, Inc. conducted a pre-assessment of the US Bering Sea and Aleutian Islands Freezer Longline Pacific Cod fishery as required by the MSC program. After review of the pre-assessment, the applicants for certification authorized the formal, full assessment of the fishery. 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 (MSC Fisheries Certification Methodology Version 5).

In order to ensure a thorough and robust assessment process, and a process in which all interested stakeholders could participate, SCS took the approach of allowing additional time as needed for both industry and stakeholders to respond to requests for information and participation.

5.1 EVALUATION TEAM

Project Manager:	Dr. Chet Chaffee, SCS (USA)
Assessor MSC Principle 1:	Dr. Ray Hilborn, University of Washington
Assessor MSC Principle 2:	Dr. David Agnew, MRAG, UK
Assessor MSC Principle 3:	Dr. Robert Trumble, MRAG Americas

5.2 OTHER FISHERIES IN THE AREA AND SUMMARY OF PREVIOUS CERTIFICATION EVALUATIONS

There are a number of other fisheries that operate in the areas where Pacific cod are caught. There are fisheries in Alaskan and US national waters for a variety of species such as salmon, groundfish, crustaceans, halibut, and rockfish. Both Alaska salmon fisheries and Bering Sea and Gulf of Alaska pollock fisheries have been assessed and certified under the MSC program. In addition, there are several other MSC assessments ongoing for fisheries in the same general area. These include the British Columbia salmon fisheries, British Columbia halibut fishery, the US black cod fishery, and the US halibut fishery. Additionally, the Alaska salmon fisheries (statewide) are going through a re-assessment process as required by the MSC to maintain a fishery certificate after its original time period of 5 years has elapsed.

5.3 THE MSC STANDARD

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 US Pacific Halibut fishery was evaluated using this same 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, fresh water fishes, and invertebrates (including, but not limited to shellfish, crustaceans and cephalopods). Aquaculture 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.

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.

5.4 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 5th version, issued April 2004.

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 9) 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.

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.

The performance indicators and scoring guideposts adopted in this evaluation are based on the evaluation team's interpretation of the MSC Principles and Criteria, as applied to the particular case of the Pacific cod fishery in the Bering Sea. 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 performance indicators and scoring guideposts used to judge this fishery are meant to be similar to, but not necessarily identical to, those used to judge similar fisheries elsewhere. It is also worth noting that the standards for MSC certification may not correspond exactly to the standards required by the fishery management plan or by the national legislation under which it operates. Therefore, if the assessment points out areas where the fishery management does not meet the MSC standards, it is not suggestive of poor management, it is only a reflection of how well the fishery management system complies with the standards for well-managed and sustainable fisheries set by the Marine Stewardship Council.

Also, it is important to remember when reading the scoring guideposts under each performance indicator that the scoring criteria established are regarded as cumulative. Thus, the fishery must first satisfy the criteria specified for a score of 60, before being assessed against those required for the 80 level. In turn, those required for the 80 level must be attained before attempting to assess the fishery against the criteria specified for 100.

5.5 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, through management processes and procedures. Indeed, in smaller fisheries it is often more difficult to obtain all the necessary documentation on a fishery as the resources are more limited than in some of the larger fisheries in developed nations. The Pacific cod fishery is part of a larger complex of groundfish fisheries in the North Pacific managed by the National marine Fisheries Service. As a result, there is a good deal of scientific research conducted on this fishery, most of which is readily accessible through the website for the NMFS Alaska Fisheries Science Center (www.afsc.noaa.gov).

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 Bering Sea and Aleutian Islands Freezer Longline Pacific cod fishery the applicants provided everything the assessment requested. A series of documents was provided that summarized and cited the scientific, technical, and management literature on the fishery.

These documents were organized by MSC Principle, and by performance indicator under each principle. In addition, the client arranged for the assessment team to meet with the appropriate scientists, managers, and enforcement officials.

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. During this fishery assessment, numerous attempts were made to gather direct information and opinions from stakeholder groups known to participate in various aspects of the management of North Pacific groundfish fisheries. No official or directed stakeholder comments were received during this assessment. In large part, the lack of stakeholder participation from the conservation sector in this assessment was purposeful. Many of the well-known and active conservation groups interested in fisheries in the North Pacific have been in discussions with the Marine Stewardship Council regarding what they consider to be technical concerns about the way in fisheries are assessed under the MSC program. The current stance adopted by many of the groups is that they will not actively engage in MSC assessments until these technical differences are sorted out. Stakeholders from industry and government were equally silent, yet it is not thought that this has anything to do with lack of communication or differences of opinion. For the most part, it has been our experience that individuals and organizations that agree with the management of a fishery simply do not believe they have the need to make this known during the assessment process as the client for the fishery assessment is already advocating for the fishery.

6 ASSESSMENT TEAM MEETINGS AND INTERVIEWS

6.1 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. 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.

6.2 FISHING INDUSTRY AND FISHERY MANAGEMENT MEETINGS

The assessment team discussed with the client on more than one occasion various aspects of the fishery. A number of meetings and phone calls were simply held to organize additional meetings and to clarify issues relating to data submissions to the evaluation team. All significant meetings were held with personnel at the National Marine Fisheries Alaska Fisheries Science Center in Seattle, Washington. Table 1 provides a general list of the people met and interviewed during the assessment process.

Table 1. People Interviewed for the Pacific Cod Assessment Process

Full Assessment	▪ Management ▪ Ecosystem ▪ Stock Assessment and Stock Status	6 June 2005	Mark Wilkins Erika Acuna Jim Stark Olaf Ormseth Dan Kimura Delsa Ander
		7 June 2005	Kathryn Cunningham Mike Canino Jennifer Boldt Libby Logerwell Grant Thompson Elizabeth Conners Jim Ianelli Shannon Fitzpatrick Craig Rose
		8 June 2005	Grant Thompson Elizabeth Conners Martin Dorn Olaf Ormseth Lowell Fritz
		9 June 2005	Sally Bibb Gary Risner Melony Brown Mary Furuness Andy Smoker

		Jennifer Sepez
		Ron Felthoven
		Martin Loefflad
		Jennifer Ferdinand
Stakeholders	none	

6.3 STAKEHOLDER MEETINGS AND INTERVIEWS

As noted above, no stakeholders officially engaged (by email, written letter, phone, or fax) the assessment team at any time during this assessment process regardless of repeated attempts by SCS to contact and engage stakeholders in the conservation sector. It is noted here that the conservation sector stakeholders (such as, but not limited to, Trustees for Alaska, Alaska Conservation Foundation, Earth Justice, Alaska Marine Conservation Council) have declared a moratorium on participating in any MSC assessment due to disagreements with the MSC on a number of technical and policy issues associated with the MSC program.

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 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 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.

Criterion 1.1 (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 the management of the Pacific cod and the regulatory system for reducing by-catch of non-target species in the freezer-longliner fishery. 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.

Sub criterion 1.1.1 There should be sufficient information on the target species and stock to allow the effects of the fishery on the stock to be evaluated.

The intention of this sub-criterion is to evaluate whether there is sufficient information available to understand how the fishery impacts the stock. Can we track trends in stock abundance, size and age structure in relation to changes in the fishery. Indicators 1.1.1.1 to 1.1.1.6 evaluate elements of the data available.

Indicator 1.1.1.1 The identification and reporting of target species well documented.

100 Scoring Guidepost

There is a very high degree of confidence in proper identification and reporting of the target species.

80 Scoring Guidepost

There is a high degree of confidence in proper identification and reporting of the target species

60 Scoring Guidepost

There is only a moderate degree of confidence in proper identification and reporting of the target species

Score 100

Pacific cod are easily identified, there are no other gadoids in significant quantities in the catch. There is extensive observer training so that the likelihood of misidentification is zero. This fishery clearly meets the 100 guideline.

Indicator 1.1.1.2 The life history of the species (including age at maturity, natural mortality, growth, and fecundity) is understood.

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

All aspects of the life history of the species are clearly documented and understood so as to support a very high degree of confidence in the evaluation of the fishery. Dependence of life history parameters on density, environment and ecologically related species is well understood and taken into account

80 Scoring Guidepost

The life history of the species is clearly documented and understood well enough to support a high degree of confidence in the evaluation of the fishery.

60 Scoring Guidepost

There are serious gaps in information but the basis of the life history is understood adequately to support a rudimentary evaluation of the fishery.

Score 85

Extensive life history information has been collected for Pacific cod since the late 1970s from fishery monitoring, resource surveys and targeted research studies and these data form the basis of values used in the stock assessment (see Thompson and Dorn 2004). Ageing of Pacific cod is reasonably difficult, and systematic ageing has only recently been reinstituted. There is some uncertainty about the natural mortality rate, and there remains the possibility that the domed selectivity curve may be partially confounded with increasing natural morality

at age. Ecosim modeling suggests a high predation rate on small Pacific cod and low predation on large Pacific cod. Fecundity studies underway at the AFSC have the potential to change assumptions on Pacific cod reproductive rates.
This indicator clearly meets the 80 scoring guidepost and goes part of the way to meeting the 100 level based on attempts to understand the role of predation in natural mortality.

Indicator 1.1.1.3 The geographical range of the target stock is known.

100 Scoring Guidepost

The complete geographic range of the stock, including seasonal patterns of movement/availability, is reliably estimated and documented each year.

80 Scoring Guidepost

A reliable estimate of the geographic range of the target stock is available including seasonal patterns of movement/availability.

60 Scoring Guidepost

- An estimate of the geographical range of the target stock is available.
- Management units encompass the range of the stock, except possibly a very minor component of the stock's range.

Score 85

The geographic range of the species is well known and seasonal migrations have been documented through tagging studies and spatial changes in catch rates. Genetic studies (Grant et al. 1987) show that the Gulf and BSAI stocks are not distinct, which is consistent with the mixing observed from tagging studies. The BSAI stock is very large compared to adjacent stocks of Pacific cod.

Catches are made in US waters up to the median line with Russia, but there is also a longline fishery for Pacific cod on the Russian side of the line in the northern Bering Sea. The BSAI stock almost certainly extends into Russian waters, but the information available to us was not sufficient to identify whether there is a significant genetic mix between the BSAI stock and cod in Russian waters (we believe that this topic is considered by the US-Russian Commission but have not managed to source any documents from this group).

This data on the status of the stock shows that performance meets the 80 guideline and very slightly, so it was assigned a score of 85..

Indicator 1.1.1.4 Information on the relationship of recruitment to parental stock is understood.

100 Scoring Guidepost

Estimates of recruitment and spawning stock are available from stock assessments. Enough years of data are available to track changes in recruitment and detect recruitment declines. The impact of environment and spawning stock on recruitment is understood.

80 Scoring Guidepost

Estimates of recruitment and spawning stock are available from stock assessments. Enough years of data are available to track changes in recruitment and detect recruitment declines.

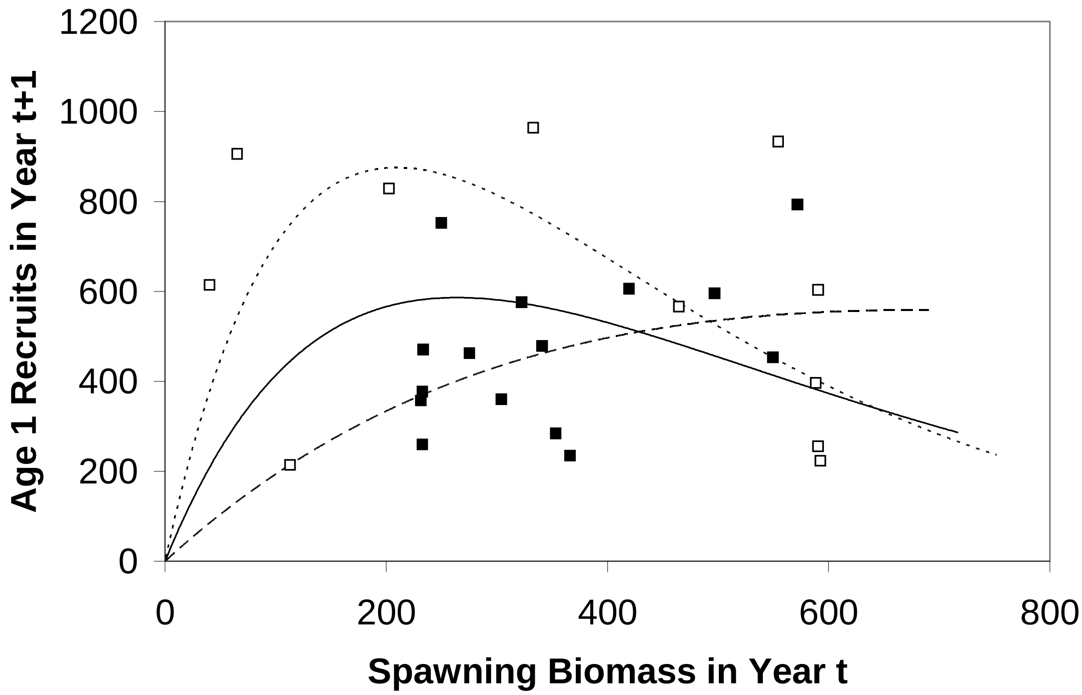
60 Scoring Guidepost

Indices of recruitment and spawning stock are available but not sufficient to track year class strengths and examine spawner recruit relationships with reliability.

Score 90

Estimates of recruitment and spawning stock are available from the stock assessments since 1978 (Thompson and Dorn 2004), and the surveys effectively measure recruitment, so the recruitment is particularly well understood. Estimates of the spawning stock are sensitive to the estimated natural mortality rate and the estimated declining right hand selectivity of the surveys. The impact of environment is not well understood, but the assessment authors have explored alternative fits to three time periods (1978- 1988, 1988-2004, and all years) and different fits are consistent with the available data. Figure 8 below (figure 2.11 of Thompson and Dorn 2004) shows the data and fit for these two time periods.

Figure 8. Spawning Stock of Pacific Cod



This stock meets 2 of the 3 criteria for 100, but given the potential weakness in spawning stock estimate it does not qualify for 100.

Indicator 1.1.1.5 Information is collected on the abundance/density of the stock.

100 Scoring Guidepost

- Multiple fishery dependent and/or fishery independent indices are available on the abundance and density of the stock for enough years that trends in abundance are understood
- Survey design and sampling methods are statistically rigorous and robust.
- Indices are consistent and there is clear evidence that they are proportional to the stock size and of sufficient precision to support a very high degree of confidence in the evaluation of the fishery.
- Uncertainties have been fully analyzed.

80 Scoring Guidepost

- Fishery dependent and/or fishery independent indices are available on the abundance of the stock for several years.
- Uncertainties have been analyzed (through for example catch-per-unit-effort standardization) and those uncertainties have been reduced so as to allow trends to be determined from indices.

- The indices are understood well enough to support a high degree of confidence in the evaluation of the trends in stock abundance.

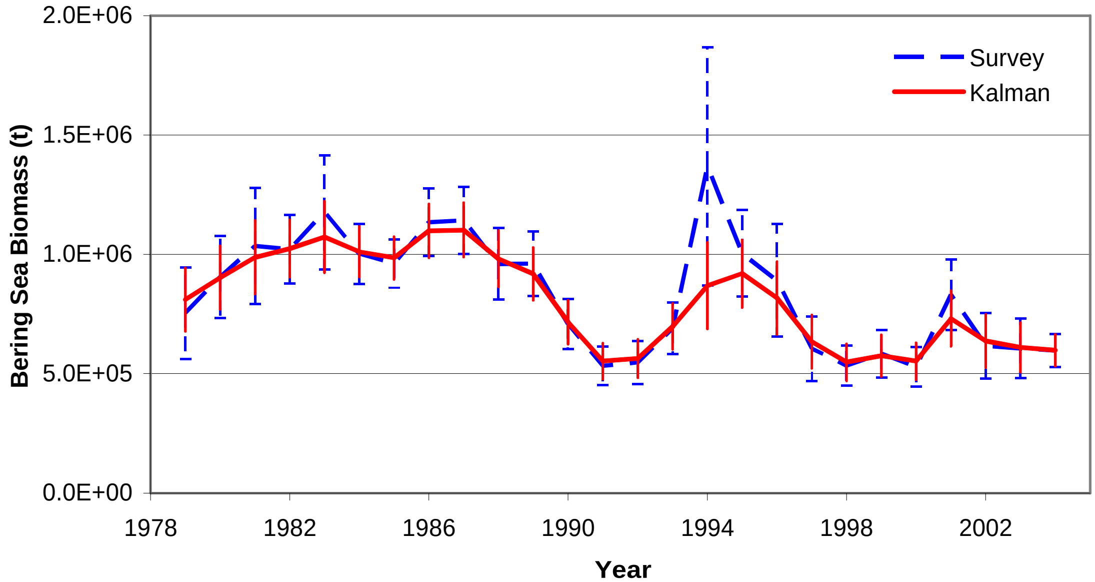
60 Scoring Guidepost

- Either fishery dependent or fishery independent indices are available on the abundance of the stock biomass for some years.
- Qualitative information exists on the appropriateness of the indices as proportional indicators of stock size and to support a rudimentary evaluation of the fishery.

Score 80

Comprehensive fishery independent surveys of abundance of Pacific cod have been conducted annually in the EBS since 1977 and triennially for the AI since 1980. In 1979, the NMFS AFSC Groundfish and Crab bottom trawl survey in the EBS was extended to include the distribution of nearly all of the fish and invertebrate biomass on the EBS shelf, including the known distribution of Pacific cod. The AFSC has also conducted an EBS slope bottom trawl survey in 2002 and 2004 that extends the depth range of the EBS shelf survey. A rigorous bottom trawl survey design and sampling methodology has been developed by the AFSC and is peer reviewed periodically. Figure 9 below shows the estimates of Pacific cod abundance from the Bering Sea trawl surveys.

Figure 9. Pacific cod Abundance



Bering Sea trawl survey estimates of Pacific cod biomass (Thompson personal communication – from powerpoint).

Collection of fishing effort and catch information has occurred through a comprehensive and detailed logbook program backed by a federal observer program since 1990. Fishing effort and catch is recorded for virtually every set of longline gear deployed. Approximately 80 percent of the fleet is further monitored 100 percent of the time by onboard federal observers with the remaining 20 percent of the fleet monitored 30 percent of the time.

The major weakness in the survey system is the inability of the survey to capture large fish. Further there is no use of CPUE data on adults from the commercial fishery even though very detailed catch and effort data are available. Thus, estimates of older fish are by projection within the model and fits to the commercial longline and trawl length frequency data rather than directly observed in surveys. Therefore there is some possible concern that a decline in older fish would not be detected.

More analysis of possible uncertainties in real trends in spawning stock size could be done by freeing up the M and selectivities in the model. A standardized CPUE analysis of LL data would provide a valuable check on the model estimates of abundance.

This fishery meets the 80 guidelines but the concerns about indirect estimation of trends in spawning stock abundance prevent the score from being higher.

Indicator 1.1.1.6 The age and/or size structure of catches is measured.

100 Scoring Guidepost

- There is comprehensive and reliable data on the age and size structure of all significant catches (including incidental catches) on an ongoing basis and support a very high degree of confidence in the evaluation of the fishery.
- A high proportion of catches are evaluated by observers.
- There is comprehensive and reliable data on the age and size structure of catches from fishery independent surveys where such surveys exist.

80 Scoring Guidepost

- Data on the age and size structure of catches in the main fishery are of adequate accuracy and measured for enough years to support a high degree of confidence in the evaluation of the fishery.
- There is confidence (through observers for instance) that the entire catch is reliably sampled.
- There is data on the age and size structure of catches from fishery independent surveys where such surveys exist and from fisheries where the target species is caught incidentally where such fisheries catch significant bycatch.

60 Scoring Guidepost

Data on the age and size structure of catches are known well enough to support a rudimentary evaluation of the fishery.

Score 90

Biological data on size structure of the Pacific cod commercial catch and supporting population are gathered routinely via an extensive at-sea and shore-side observer program and annual or periodic surveys of the Eastern Bering Sea and Aleutian Islands.
Pacific cod are notoriously difficult to age. Historically, this species has been aged via scales, otoliths, fin rays and length-frequency. Rapid growth in the early ages has made it difficult to distinguish annular rings from false checks. Scales were the preferred age structure for detecting annual growth zones at early age but typically underrepresented the older age classes. Otoliths and fin-rays were preferred for identification of older age classes but proved difficult to interpret near the structure's focus. NMFS-AFSC, after nearly a 10- year hiatus, has reinstituted production aging for Pacific cod based on interpretation of otolith cross-sections using the break-and-burn method to highlight annual growth zones.. Aging methods have been validated indirectly using growth increments from tagged and recaptured fish.

Because the size structure of both catch and survey data are so well covered this fishery comes close to the 100 guideline, but the lack of older individuals in the survey, and the poor relationship between size and age means that there is not a high degree of confidence in the age composition of the total stock.

Subcriterion 1.1.2 There should be sufficient information on the fishery to allow its effects on the target stock to be evaluated

Intent: This subcriterion refers to the understanding of the fishery while the previous subcriterion dealt with the understanding of the stock.

Indicator 1.1.2.1 Fishery related mortality is recorded/ estimated (including landings, discards and incidental mortality).

100 Scoring Guidepost

- Landings, discards, and incidental mortality are accurately estimated and monitored for each gear type to support a very high degree of confidence in the evaluation of the fishery.
- A high proportion of sets are observed or other measures are in place to measure discarding independent of logbooks.

80 Scoring Guidepost

- Landings, discards, and incidental mortality are well estimated for each gear type to support a high degree of confidence in the evaluation of the fishery.
- The estimates of discarding and incidental mortality are verified by observers or some form of statistical sampling.

60 Scoring Guidepost

- Sufficient information is available to allow accurate estimates to be made of landings broken down as required for a rudimentary evaluation of the fishery.
- Estimates of discards and incidental mortality are available.

Score 95

The BSAI Pacific cod groundfish fishery is prosecuted by four gear types: groundfish trawl, longline, and pot are the main fisheries with a small jig fishery as a minor component. In the federal fishery, all vessels over 60' length overall (LOA) are required to carry an onboard observer. Vessels 60' to 125' must carry an observer on at-least 30 percent of their fishing days (or pot lifts) and at-all times on at least one trip per fishing quarter; vessels 125' and larger must carry an observer at all times (50 CFR 679.50). Observers sample the catch for retained and discarded catch of groundfish and prohibited species such as halibut, crab and salmon. Sampling procedures are stipulated in the North Pacific Groundfish Observer Manual. An observer program has been in place since 1973. The domestic groundfish fishery observer program has been in place since 1990. Prior to its inception observers were required on foreign fishing vessels participating in the groundfish fishery but not on domestic vessels.

The number of vessels landing Pacific cod from 1999 to 2003 has averaged 115 catcher vessels (CV) and 35 catcher/processors (CP) in the trawl fleet, 15 hook and line CVs and 40 hook and line CPs all over 60'; 79 pot CVs ≥ 60', 6 pot CPs ≥ 60'; 17 jig CVs < 60', and 31 combination hook and line and pot CVs < 60'.

The most recent account of the percentage of catch observed comes from the November 2004 draft Environmental Assessment (EA) on revisions to the NMFS observer program. In the 2001 targeted Pacific cod fishery, onboard observers actually observed 52 percent of the longline catch, 28 percent of the pot catch, and 38 percent of the trawl catch in the BSAI. On average from 2000-2002, over 28,000 observer days were recorded annually in the BSAI groundfish fishery.

Observer coverage in the freezer longline fishery is very high providing a high degree of confidence in the estimates of catch and discards. Nevertheless 20% of boats are not fully observed and can adjust their fishing to bias the observer data and observed boats can in principle fish differently for observed vs unobserved sets. Thus the fishery does not quite meet the 100 criteria.

Indicator 1.1.2.2 Fishing effort is recorded, estimated, and standardized to effective fishing effort.

100 Scoring Guidepost
Comprehensive records are kept of fishing effort, recorded at sub-annual intervals at an appropriate degree of spatial resolution and have been standardized to effective fishing effort and support a very high degree of confidence in the evaluation of the fishery.

80 Scoring Guidepost

- Accurate estimates of effective fishing effort have been made and support a high degree of confidence in the evaluation of the fishery.
- The effort data are available on the spatial scale of stock structure and or management units.

60 Scoring Guidepost

Nominal effort data are available which can be used to estimate effective fishing effort well enough to support a rudimentary evaluation of the trends in fishing effort .

Score 95

There is a comprehensive and detailed record of all fishing effort conducted in the freezer longline target fishery for Pacific cod. NOAA Fisheries requires by regulation (50 CFR 679.5) each fishing vessel to maintain a daily cumulative production logbook (DCPL). Information required in the logbook form includes information on fishing effort by longline set including: type of longline gear, length of a skate, size of hook, hook spacing, number of hooks per skate, start and end time and date, start and end latitude and longitude, start and end depth, number of skates set, number of skates lost, and catch of target, bycatch and prohibited species. This information is collected on 100 percent of the longline fishing effort for Pacific cod in the BSAI. Each permit holder must submit timely logbook reports to NOAA fisheries. USCG and NOAA enforcement conducts both on water and dock checks of fishing vessels to assure compliance with logbook record keeping requirements. The location of each vessel is monitored by VMS and the reliability of logbooks can be verified from the VMS data.

Additionally, fishing effort and catch information is collected by federal observers onboard the vessels, and from processors. Approximately 80 percent of the freezer longliners targeting Pacific cod have 100 percent observer coverage and 20 percent of the fleet has 30 percent observer coverage.

Thus there is a very high degree of confidence in the effort data for this fishery. Although the effort data are not used in the stock assessment model, they are used in-season to assure the TAC is not exceeded. The 100 Scoring Guidepost specifies standardization of effort. Because the fleet has been very stable over time, there is little concern that the catching power has changed due to changes in fleet composition and we doubt that standardization would produce a very different assessment of effort.

Indicator 1.1.2.3 Fishing methods and gear types are known throughout the fishery.

100 Scoring Guidepost

- All fishing methods and gear types employed in the fishery are known.
- In-situ observations are made of fishing practices.
- The information and observations support a very high degree of confidence in the evaluation of the fishery.

80 Scoring Guidepost

Main fishing methods and all gear types are known and quantitative information is available on the geographical pattern of effort by gear to support a high degree of confidence in evaluation of the fishery.

60 Scoring Guidepost

Main fishing methods and gear types are known for the fishery well enough to support a rudimentary evaluation of the fishery.

Score 100

The BSAI Pacific cod fishery is allocated cod annually by industry sector/gear type and fishing practices are observed and documented by the federal observer program. The allocation of BSAI cod by gear type, the observations and reporting of catches by the observer program and the enforcement of fishery regulations by the USCG and NMFS OLE provide for a very high degree of confidence in the evaluation of the fishery. Gear specific allocations are hook and line demersal longline gear, trawl gear, pot gear, and jig gear. Details of industry sectors, allocations and BSAI cod utilization are available in North Pacific Fishery Management Council Plan Amendments 24, 46, 64, 67 and 77.

The BSAI freezer longline fleet is the largest industry sector in the BSAI Pacific cod fishery. This industry sector conducts its cod fishery with a single gear type - demersal longline gear. Demersal longline gear components used by the BSAI freezer longline fleet are highly consistent between vessels, and well documented. The BSAI freezer longline fleet is subject to federal observer coverage during fishing and processing operations. More than 80 percent of the vessels exceed 124 ft LOA and are subject to 100 percent observer coverage. The remainder of the vessels in this fleet is 124 ft LOA or smaller and subject to observer coverage 30 percent of their annual operation. In addition to observer coverage, all vessels in this fleet are required to maintain a federal log of daily fishing operations including set/haul position, fishing effort details, catch, bycatch and products produced. Fishing regulations are enforced by USCG and NOAA. Individuals from these federal agencies board and inspect freezer longline vessels on the fishing grounds on a regular basis. Fishery information collected from this fleet is regarded as highly creditable and accurate.
This fishery meets all criteria for 100.

Indicator 1.1.2.4 Selectivity is known for the fishery (including incidental catches).

100 Scoring Guidepost

Full selectivities have been accurately estimated for all gears, locations and times of fishing over time and support a very high degree of confidence in the evaluation of the fishery.

80 Scoring Guidepost

Selectivities of all gear types including incidental fisheries are well estimated by size of fish with sufficient accuracy to support a high degree of confidence in evaluation of the fishery. Information is available to evaluate any possible changes in selectivity of gear over time.

60 Scoring Guidepost

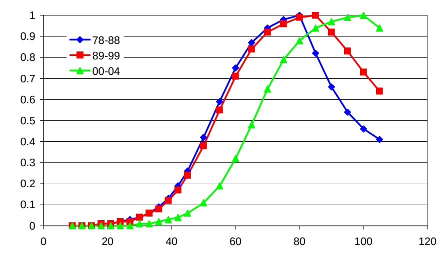
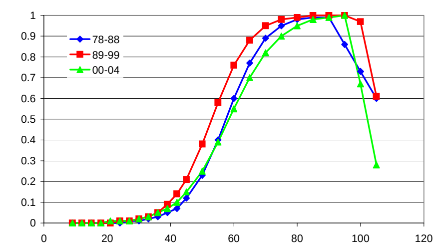
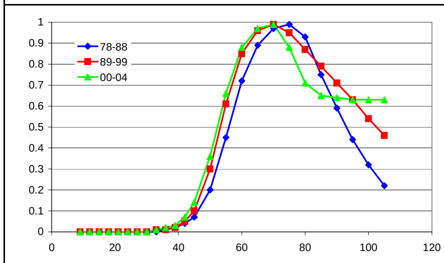
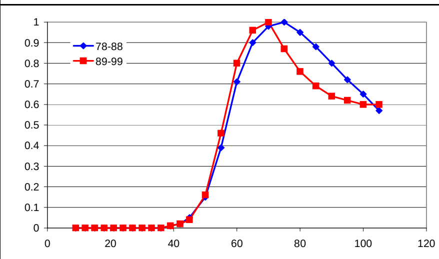
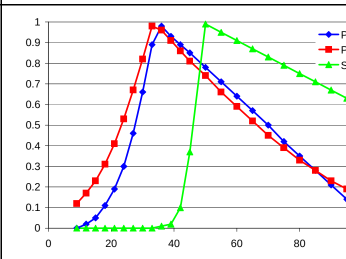
Some information is available on selectivity and qualitative changes in selectivity and support a rudimentary evaluation of the fishery.

Score 90

Selectivity by gear type is estimated within the stock assessment model. Selectivity is blocked into gear specific and time specific stanzas (Figure 10). Independent estimates are calculated for the January-May and June-December trawl fishery, for three time stanzas: 1978-1988, 1989-1999, and 2000-2004. Selectivity in the longline and pot fishery is estimated to be constant throughout the fishing year. The longline fishery is blocked into the same time stanzas as used in the trawl fishery. For the pot fishery, the time stanzas are 1989- 1999 and 2000-2004. The jig fishery accounts for less than 1 percent of the annual Pacific cod catch. There is no attempt to generate independent estimates of selectivity for the jig fishery.

Catch sampling covers all Pacific cod fisheries, so that the estimated selectivity is an integration of targeted and non-targeted fishing over the entire sampled fleet. Prior to 2000, Pacific cod were first selected to the trawl fishery at 18 cm (Age 2), however, after 1999 first selection did not occur until 30 cm (Age 3). Initial selection occurs at a slightly larger size in the longline and pot fishery, 33-36 cm in the longline and 39 cm in the pot fishery (Age 3). In the trawl, longline and pot fisheries the size at 50 percent selection to the fishery is approximately 50-55 cm (4 years of age). Full selection in the trawl fishery is achieved at 80-85 cm (Age 8-9), and about 70-75 cm in the longline and pot fisheries (Age 6-7). Only the Jun – Dec trawl fishery appears to have been able to fully select the largest fish (100cm) over the whole period of the fishery.

Figure 10 Selectivities determined by the assessment. From Thompson & Dorn 2004, and Thompson pers. comm. (presentation to SCS assessment team, June 2005)

Jan – May Trawl	June – Dec Trawl	
		
Longline	Pot	Trawl Survey
		

We have a high degree of confidence that we understand the selectivities of these fisheries. However, because there is a correlation between the estimated natural mortality rate and the declining right hand selectivity it is possible that a combination of changes in selectivity and natural mortality on older fish could be confounded. The assessment team does not believe that the confounding would cause errors sufficient to mask collapse but enough to score the fishery below 100.

Indicator 1.1.2.5 Other fisheries in the area that are not subject to certification are identified and monitored.

100 Scoring Guidepost

All fisheries (and other sources of human-induced mortality) in the area that are not subject to certification are identified, monitored, and included in the stock assessments and support a very high degree of confidence in the evaluation of the fishery.

80 Scoring Guidepost

- The main fisheries not subject to certification are identified.
- Significant mortalities of the subject stock from those fisheries are included in the stock assessments and support a high degree of confidence in the evaluation of the fishery.

60 Scoring Guidepost

- There is some information relating to other fisheries in the area that are not subject to certification, although these are not adequately monitored.
- Significant removals of the subject stock by these fisheries are accounted for in the stock assessments well enough to support a rudimentary evaluation of the fishery.

Score 90

All other federally managed fisheries not subject to MSC certification targeting Pacific cod or harvesting Pacific cod as bycatch are identified, monitored for both catch and effort, and included in the stock assessment and fishery management processes in the BSAI. Trawl and pot fisheries targeting Pacific cod have similar comprehensive logbook data collection regulations as those imposed on the BSAI freezer longline fishery and are monitored by the USGC, NOAA enforcement and the federal onboard observer programs. Beginning in 1998, 100 percent retention of Pacific cod and pollock was required in federally managed fisheries in Alaska, regardless of target species or gear type. Only fish not fit for human consumption can be discarded but the weight of any such discards must also be reported. The Pacific cod fishing mortality resulting from these other fisheries is accurately estimated, included in the stock assessment models and supports a high degree of confidence in the evaluation of the fishery. All cod catches are counted against the annual Total Allowable Catch. There does not seem to be any IUU catch of cod (see 2.1.2.3).

The portion of catcher boat fishing that is not observed (about 70% are vessels under 125 ft. and are not fully observed) could allow for some misreported catch. However, the quantity of catch in this category is low compared to the observed catch (about 20%). Vessels fishing for Pacific halibut are not required to carry observers unless they retain more than specified levels groundfish. However, many vessels with Pacific halibut individual quotas retain halibut during groundfish trips. Pacific cod discards in the unobserved Pacific halibut fishery would go unreported. Russian catches of this stock are unknown. Uncertainties about this and the unobserved boats reduces the score from 100 to 90.

Subcriterion 1.1.3 Appropriate reference levels have been developed for stock abundance and fishing mortality rate.

Intent: The intent of this subcriterion is to assure that the management agency has developed targets and limits based on the biology of the fish to guide evaluation of the catch.

Indicator 1.1.3.1 There are limit and target reference points that are appropriate for the stock and take ecosystem effects into account. These include limit fishing mortality rates and both limit and target stock abundance levels.

100 Scoring Guidepost

- Limit and target points are justified based on stock biology, uncertainty, variability, data limitations and statistical simulations of these factors.
- Limit and target points take account of ecological impacts and uncertainties associated with those impacts.

80 Scoring Guidepost

- Limit and target points are determined based on stock biology (e.g. a stock-recruitment relationship), they are measurable given data and assessment limitations.
- Ecosystem effects have been considered qualitatively.

60 Scoring Guidepost

- Limit and target points have been chosen and are justified by general agreement among regional fishery scientists that they are appropriate to achieve management goals for the target stock.
- Ecosystem effects are not implicitly or explicitly taken account of in setting reference points for the target species.

Score 80

The harvest control rules applied to the NPFMC/NMFS groundfish fishery are driven by National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act, i.e., “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.” The adopted rules follow a classical single-species yield maximizing strategy, with provisions to discount the maximum permissible harvest rate when spawning stock biomass falls below stipulated breaking points. Additionally, the allowable harvest rate is deliberately set to be less than the fishing mortality rate that would provoke overfishing. The NPFMC Groundfish Fishery Management Plan (FMP) defines three quantities associated with establishment of levels of acceptable biological catch (ABC): 1) Optimum yield (OY), 2) Overfishing Level (OFL) and 3) ABC. OY is a fixed tonnage cap, OFL and ABC are catch levels associated with specific fishing mortality rates (FOFL and FABC). FOFL is the “limit” fishing mortality rate, and FABC is the target fishing mortality rate. In addition, the Council typically sets the total allowable catch (TAC) equal to or less than the recommended ABC. Adjustments to TAC take into account social/political and economic considerations that control the complex of fisheries regulated by the Council.

In the BSAI region the Council has established an OY cap of 2.0 million mt. This cap is applied to the aggregate catch of all regulated groundfish species. Because the sum of the recommended ABCs across all managed species is typically greater than OY, the practical implication of the OY cap is that it becomes constraining on TAC.

The OFL and ABC are set for groundfish species based on a 6 tier set of decision rules. The rules were intended to reflect increasing conservatism based on the level of demographic detail available to assess the managed stocks. However, as noted in a comprehensive review of the Council's ABC setting policy, the rule is not necessarily more conservative for stocks with little or no demographic data. The tier system is described in the introduction to the annual SAFE. The harvest control rule defines overfishing as any fishing mortality in excess of the maximum fishing mortality threshold (MFMT). The fishing mortality rate associated with ABC is based either on maximizing yield for stocks with a known reliable spawner/recruit relationship, or maximizing yield per recruit when there is no reliable spawner/recruit relationship. The fishing mortality rates that maximize yield per recruit are adapted from the work of Clark (1991, 1993, and 2002) and others.

In 2004, Pacific cod were assigned to tier 3b. Tier 3 corresponds to stocks where there is a reliable estimate of stock biomass, the biomass level that corresponds to both 35 percent and 40 percent of the unfished spawning biomass (B35% and B40%), and the fishing mortality rates that drive the spawning biomass per recruit to 35 percent and 40 percent of the unfished spawning biomass per recruit (F35% and F40%). When the estimated (modeled) current stock biomass is greater than B40% then OFL is set at F35% and ABC at F40%. If the current stock biomass is less than B40% an adjustment proportional to the ratio of current stock biomass and B40% is made to the maximum permissible ABC. The effect of this is to lower the exploitation rate when the stock falls below B40%.

The adjustment generates a linear decrease in the allowed ABC fishing mortality rate as stock biomass declines. This decrease is intended to provoke a more rapid recovery to the biomass level supporting maximum sustainable yield. The estimated 2004 Pacific cod spawning stock biomass was 3 percent below the B40% biomass level, which caused the stock to be classified in tier 3b.

The Council's adopted harvest control rule sets the upper bound on ABC. Stock analysts and the Council's SSC may recommend lower ABCs dependent upon exigent circumstances. In the 2004 stock assessment the assessment authors invoked a "quasi decision theoretic" approach that utilized a yield stabilizing optimization function to identify a downward adjustment to ABC to account for a discrepancy between model estimated and survey estimated stock biomass. The authors believed that the uncertainty in estimated stock biomass warranted this adjustment.

In summary, the harvest control rule applied to Pacific cod begins by defining a maximum fishing mortality threshold; then, deliberately sets an acceptable level of fishing mortality below the MFMT; and, further reduces the FABC when current stock biomass falls below target biomass thresholds; and allows for ad hoc downward adjustments only based upon acceptable rationales presented by the stock assessment analysts and/or the Council's SSC. Once the ABC is set, the Council may further limit total allowable catch to maintain overall compliance with limits on OY.

While, the current assessment does not quantitatively consider ecosystem effects in the determination of ABC, these effects are taken into consideration in a qualitative manner. Among the items considered are ecosystem effects on the Pacific cod stock and the Pacific cod fishery effects on the ecosystem. The latter are broken down into effects of bycatch on non-target species, impacts on Steller sea lions (a listed endangered species), impacts on seabirds (including the ESA listed short-tailed albatross), and fishery usage of habitat. There is considerable discussion within the Council commissioned review of the F40% harvest policy regarding opportunities and challenges involved in the integration of ecosystem considerations in the setting of harvest control rules.

The basic F40% and F35% reference points are from generic simulations by Mace {Mace, 1994 }and Clark {Clark, 1991 }, and have not been done specifically for the biology of this stock. This species is classified into Tier 3, primarily because the assessment does not produce distributions of model outputs but relies on the statistical "point estimate". Given these two limitations of the reference points and harvest rules the fishery does not meet the 100 criteria in this respect. Nevertheless the reference points are widely accepted internationally and have a high probability of meeting conservation and utilization objectives.

The ecosystem effects are taken into account primarily through the 2 M ton cap on total catch across all species. The Freezer-Longliner fishery is very species specific and the catch of all other species is well within ABCs so there are relatively few ecosystem concerns about by-catch (but see section 3).

Indicator 1.1.3.2 Reference points meet acceptable international standards.

100 Scoring Guidepost

Reference points meet or exceed international standards.

80 Scoring Guidepost

Reference points recognize, and are in line with, acceptable international standards.

60 Scoring Guidepost

Reference points recognize appropriate international standards and are being developed to meet these.

Score 90

The F40% reference point is consistent with most accepted values (Clark 1991, Mace 1994), especially so since the ecosystem simulations (Aydin 200?) show that trophic interactions mean that fishing mortality rates could be higher than when trophic interactions are ignored as is assumed in the single species models for which F40% was derived. The F40% is also consistent with the FAO Code of Conduct for responsible fishing.

However, another aspect of international standards for reference points is simulation testing of the performance against the biology of the stock and the uncertainties in the stock assessment and management process. Hilborn and Walters (1992) have argued that all harvest strategies should be tested in by such simulations. This testing has not been done and therefore the reference points do not fully meet international standards.

Subcriterion 1.1.4 There is a well-defined and effective harvest strategy to manage the target stock.

Indicator 1.1.4.1 There is a harvest strategy in place to adjust harvest as required for management of the stock.

100 Scoring Guidepost

- Mechanisms are in place to reduce harvest as stock biomass declines and have been demonstrated to allow for stock recovery if the stock is depleted
- The robustness of these mechanisms has been tested to verify robustness to uncertainty in data inputs and stock biology.
- Measures to demonstrate effectiveness are in place.

80 Scoring Guidepost

Mechanisms are in place to reduce harvest as stock biomass declines and have been demonstrated to allow for stock recovery if the stock is depleted.

60 Scoring Guidepost

Mechanisms exist to monitor and (if necessary) reduce harvest, but do not fully contain harvest, or have not been tested, but nevertheless provide a moderate degree of confidence in the management of the stock.

Score 95

The harvest rules are discussed extensively in indicator 1.1.3.1. There is a target exploitation rate, that is reduced when the stock falls below the threshold level (B40%). This type of harvest strategy has been extensively simulation tested across a wide range of biological assumptions ({Magnusson, 1989}, {Hilborn, 2002) and the overall performance of such strategies is understood in theory. The performance of these harvest strategies has been evaluated by simulation for this stock in the projections part of the assessment (Thompson and Dorn 2004).

However, similar rules applied to Gulf of Alaska pollock have not been successful at maintaining the stock abundance, but this appears to be due to an ongoing series of very poor recruitments (MSC Gulf Pollock evaluation).

Given that the only significant management option to low abundance is to reduce catches, and this is built into the harvest rules we scored this indicator highly.

Indicator 1.1.4.2 There are clear, tested decision rules set out for effective management of the stock

100 Scoring Guidepost

- Clear, documented, and tested decision rules are fully implemented and have been fully reconciled with reference points and there is a very high degree of confidence in their effectiveness for management.
- Data and assessment limitations have been periodically evaluated.

80 Scoring Guidepost

- Clear decision making rules exist, are fully documented, but have not been fully tested.
- Decision rules are reconciled with reference points and with data and assessment limitations and there is a high degree of confidence in their effectiveness for management.

60 Scoring Guidepost

- It can be demonstrated that decision making, though not documented, is logical and appropriate.
- Rules have not been tested, but there is a moderate degree of confidence in their effectiveness for management.

Score 100

This indicator is primarily interpreted to mean the implementation to achieve the TAC that emerges from the harvest strategy. There is a detailed process of in-season catch monitoring conducted by NOAA that involves daily tracking of catches from observer reports as well as reports from the vessels. At a higher level the North Pacific Council has consistently followed the advice of the SSC re ABC, so the harvest strategy is being followed.

Indicator 1.1.4.3 There are appropriate management tools specified to implement decisions in terms of input and/or output controls for management of the stock.

100 Scoring Guidepost

- Management tools, appropriate to the species and fishery, have been specified to implement decisions of input and/or output controls.
- Tools are responsive, relevant and timely. Performance of the tools has been evaluated and evidence exists to show clearly that tools when combined with the decision rules achieve a high probability of achieving management objectives.

80 Scoring Guidepost

- Management tools have been specified to implement decisions of input and/or output controls.
- It has been demonstrated that these tools affect fishing mortality.
- The tools in place, when combined with the decision rules are demonstrated to lead to long term sustainable management of the stock.

60 Scoring Guidepost

- Management tools exist to implement decisions of input and/or output controls although these are not developed for the specific fishery, or management tools are not fully developed, but are specifically related to the fishery.
- Some evidence exists to show that tools can be effective at reducing fishing mortality in the event of significant stock declines.

Score 95

We interpret this as whether the in-season management system works in order to achieve the TAC. Table 2 below (from Table 2.2 of Thompson and Dorn) shows the ABC, the TAC and the actual catch. Since 1995 the catch has not exceeded the TAC.

Table 2. The TAC, ABC, and Catch for Pacific cod from 1990 – 2004.

Year	ABC	TAC	Catch
1990	417,000	227,000	179,608
1991	229,000	229,000	219,266
1992	182,000	182,000	208,046
1993	164,500	164,500	167,389
1994	191,000	191,000	193,802
1995	328,000	250,000	245,029
1996	305,000	270,000	240,673

1997	306,000	270,000	257,762
1998	210,000	210,000	193,253
1999	177,000	177,000	173,995
2000	193,000	193,000	191,056
2001	188,000	188,000	176,659
2002	223,000	200,000	197,352
2003	223,000	207,500	209,114
2004	223,000	215,500	172,620

The in-season management system evaluated in 1.1.4.2 clearly works well at restricting catch to the TAC or less.

A second element of the management tools is the avoidance of by-catch. There are two elements to this. First is a set of closed areas that are monitored by VMS on all vessels. In addition, the industry maintains an in-season monitoring system and a set of voluntary area closures to avoid areas of high by-catch. Vessels report by-catch daily to an industry funded consulting firm that maps locations of high by-catch and moves vessels out of areas of high by-catch (Janet Smoker, personal communication).

Subcriterion 1.1.5 There is a robust assessment of stocks.

Indicator 1.1.5.1 There are assessment models used for robust assessment of the stock The model considers the spatial structure of the stock. The assessment has been tested for robustness using simulation.

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

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

- The assessment model does not take proper account of spatial structure and only accounts for fishing mortality from landings from the principle fishery.
- Model estimation procedures take limited or inappropriate account of statistical uncertainty.
- Sensitivity analyses are limited or non-existent.
- Results of sensitivity analyses are not properly taken into account in the harvest strategy.

Score 80

The assessment model considers the Bering Sea and Aleutian Islands as a single stock, but given the known movements from tagging it is questionable if a spatially explicit model, with additional parameters, would be a more robust assessment. The basic structure of the model is among those that would be considered “state of the art”, that is fit to a range of data sources with an age-structured model as its core. It is increasingly common to calculate probability distributions for model parameters, generally by Bayesian methods (as in Bering Sea pollock), and this is not done in the 2004 Pacific cod assessment although planned for the next round of assessments. All likely sources of fishing mortality are included.

The natural mortality rate in the model is assumed to be age and time invariant, which does subsume any predation mortality.

The maximum likelihood estimation takes account of observation error in the data sources in a standard way, and process error is accounted for in recruitment variation and temporal changes in selectivity.

Sensitivity analysis to estimates of M and q were done extensively in the late 1990s (Thompson 1997, 1998, 1999 documents in mail to me). The other significant parameters are estimated within the model.

The current projection simulations that effectively test the harvest strategy are conducted using the point estimates of the stock assessment and simulated future recruitments. We felt that in order to score above 80 the simulations should consider all of the uncertainty in model outputs. This is being done in the 2005 BSAI Pacific cod assessment which uses the Bayesian software Stock Synthesis II (Thompson personal communication).

Indicator 1.1.5.2 The assessment takes sufficient account of major uncertainties in data (including evaluation of assumptions) to provide a robust assessment of the stock.

100 Scoring Guidepost

The assessment addresses all significant uncertainties in the data and functional relationships and evaluates the assumptions in terms of scope, direction and bias relative to management-related quantities.

80 Scoring Guidepost

- The assessment takes into account major uncertainties in the data and functional relationships.
- The most important assumptions have been evaluated, the consequences are known.

60 Scoring Guidepost

- Major uncertainties are identified.
- Some attempt has been made to evaluate these in the assessment.

Score 80

The evaluation of this indicator is similar to that for indicator 1.1.5.1. The major uncertainties have been evaluated in the past, but not fully integrated into the assessment through considering uncertainty in all model outputs in evaluation of consequences of future catch levels.

Indicator 1.1.5.3 Uncertainties and assumptions are reflected in management advice.

100 Scoring Guidepost

All significant uncertainties and assumptions are addressed and reflected in the management advice, including appropriate decision rules.

80 Scoring Guidepost

Major uncertainties and assumptions are addressed in the management advice and through the appropriate decision rules to address those limitations.

60 Scoring Guidepost

Major uncertainties are recognized and are reported in management advice, as well as possible implications of those uncertainties on the management advice.

Score 85

The major uncertainties in this assessment are the natural mortality rate, the survey efficiency (q), fecundity, aging of individuals, the relationship between M and the selectivity. The primary way in which these uncertainty are taken into account in the management is remaining at Tier III.

A second way in which uncertainty is used is the fact that the ABC is set at 90% of the maximum ABC. This value was 87% up to 2002 (Thompson and Dorn), and after further calculations was set to 90%. Furthermore, in years of high Pollock TAC the OY rule has meant that the TAC for Pacific Cod is significantly below the ABC (e.g. 1990, 1995, see Table in 1.1.4.3).

The system meets the 80 criteria and exceeds it slightly.

Indicator 1.1.5.4 The assessment evaluates current stock and fishing mortality status relative to reference points.

100 Scoring Guidepost

The assessment makes a reliable probabilistic evaluation of the stock status and fishing mortality status relative to the reference points.

80 Scoring Guidepost

The assessment makes an evaluation of the stock status and fishing mortality status relative to the reference points, but does not attempt to estimate the uncertainty regarding these estimates.

60 Scoring Guidepost

Some attempt is made to estimate the stock status relative to reference points

Score 80

The assessment finds the best fit to the data and estimates the history of spawning stock sizes, recruitments and fishing mortalities. These estimates are then compared to the reference points and the ABC is calculated from the harvest rule.

The assessment precisely meets the 80 Scoring Guidepost. The assessment provides the best fit to the data and thus the reference points, but the distribution of the parameters is not estimated (Tier 1). Uncertainty in future recruitment is accounted for in evaluation of reference points.

Indicator 1.1.5.5 The assessment model is used to evaluate the consequences of current harvest strategies.

100 Scoring Guidepost

- The assessment model has been used to evaluate the consequences of the harvest strategy.
- Such uncertainties in the assessment model are carried forward into the harvest strategy evaluation.
- The assessment model and harvest strategy operate on the same spatial and temporal scale.

80 Scoring Guidepost

The assessment model has been used to evaluate the consequences of the harvest strategy.

60 Scoring Guidepost

The assessment model has not been used to evaluate the consequences of the harvest strategy.

Score 80

The harvest strategy is evaluated using the MLE estimates of the stock assessment and simulated future recruitments. This is the standard of the 80 guidepost. To move towards the 100 guidepost the uncertainties in model parameters would need to be included in the simulations of harvest strategies. This is planned for the 2005 assessment (Thompson personal communication) but is not included in the work evaluated in this report.

Subcriterion 1.1.6 The stock(s) is/are at appropriate reference level(s).

Indicator 1.1.6.1 The stock(s) is at or above appropriate reference levels.

100 Scoring Guidepost

Assessments show the stock above the target reference point more than 50% of the time in recent years.

80 Scoring Guidepost

Assessments show the stock has a greater than 50% probability of being above the limit reference point.

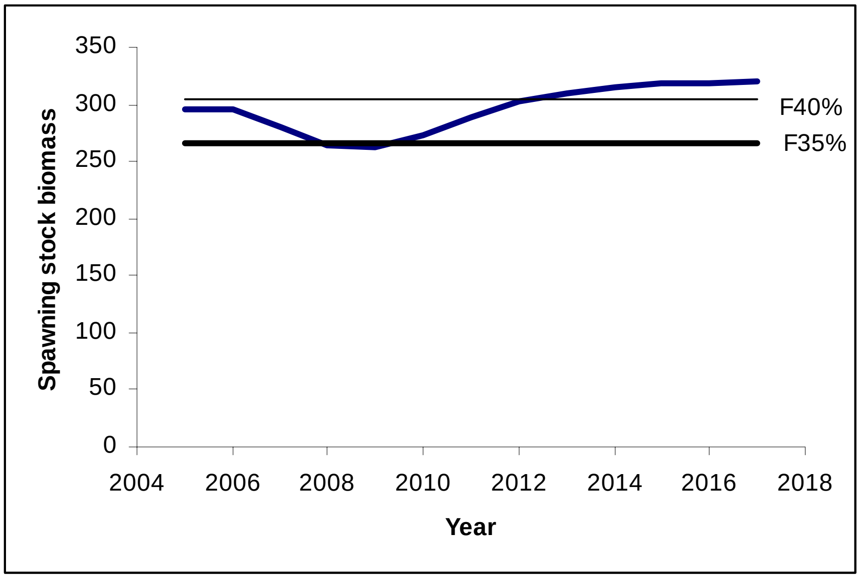
60 Scoring Guidepost

Assessments show the stock is likely above the limit reference point. However, the probability is undefined.

Score 80

Table 2.29 of Thompson and Dorn (2004) shows the projections under a 90% of FABC and figure 11 below shows the median projected spawning biomass in relation to the F40% and F35% reference points. The median projected spawning stock biomass is not expected to be above the target reference point until 2013, whereas the stock is expected to be above the limit reference point in almost all years, falling slightly below in 2007-2009.

Fig. 11. Spawning Stock related to reference points.



This meets the 80 Scoring Guidepost.

Indicator 1.1.6.2 The fishing mortality rate is below the appropriate limit reference point.

100 Scoring Guidepost

Assessments show the fishing mortality rate very likely below the limit reference point consistently for several years.

80 Scoring Guidepost

Assessments show the fishing mortality rate is very likely below the limit reference point most of the time in recent years.

60 Scoring Guidepost

Assessments show the fishing mortality rate is likely below the limit reference point most of the time in recent years.

Score 100

From the projections in Table 2.29 of Thompson and Dorn (2004) the projected median exploitation rates and the target and limit reference points are shown in figure 12 below. There is a high probability of the stock being below the target exploitation rate and very high probability of it being below the limit reference point.

Fig. 12. Fishing Mortality in relation to reference points for Pacific cod.

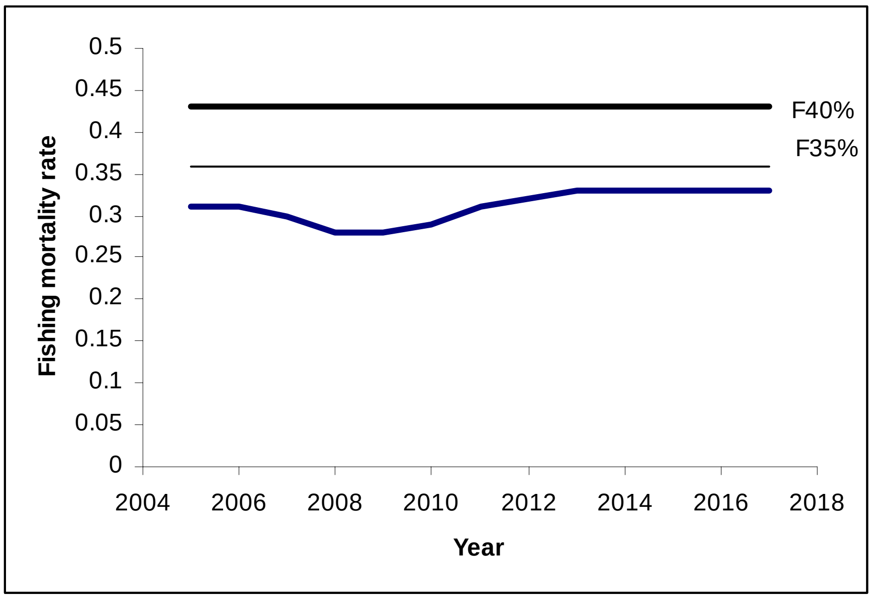
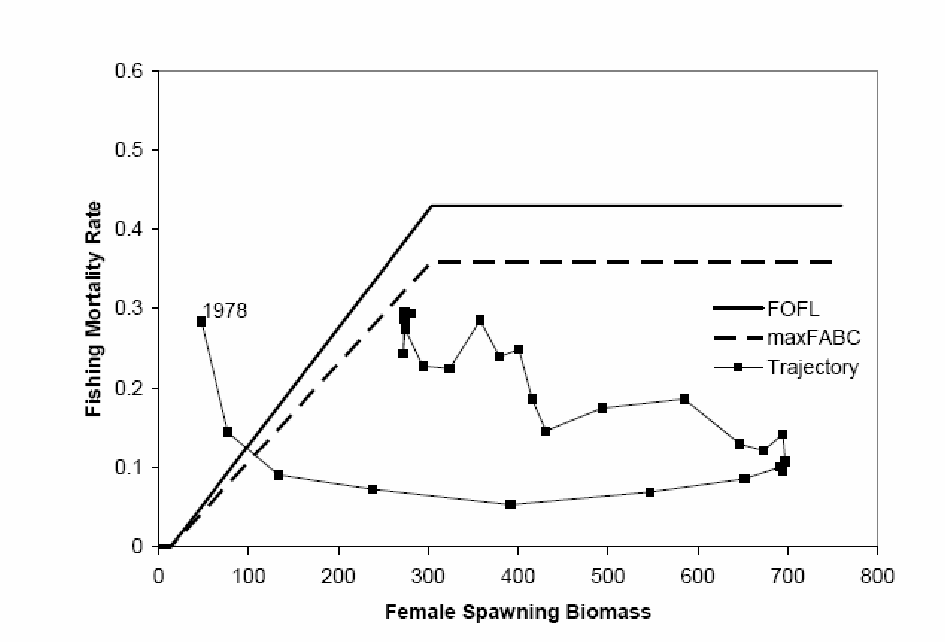


Figure 13 below (Figure 2.9 from Thompson and Dorn 2004) shows the historical trend in fishing mortality rate compared to the reference points.

Fig. 13. Historical trends in Fishing Mortality Rates



1.2 (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.

Indicator 1.2.1 When the stock is below the target point, there are measures to rebuild the stock specified and implemented for recovery and rebuilding of the stock.

100 Scoring Guidepost

Appropriate rebuilding measures are being implemented to promote recovery as quickly as is possible. Additional measures are being implemented to prevent problems in the future. Total fishing mortality is nearly zero if the stock is below the limit reference point.

80 Scoring Guidepost

Appropriate rebuilding measures are being implemented to promote recovery within reasonable time frames. Measures have been tested and can be shown to be rebuilding the stock. Target fishing mortality is reduced enough when the stock is below the limit reference point to allow rebuilding in a timely fashion.

60 Scoring Guidepost

Appropriate rebuilding measures through reduction in exploitation exist and are being implemented. Rebuilding measures other than reduction in exploitation are being considered. Measures are implemented even if they have not been tested. Fishing mortality is further reduced if the stock is below the limit reference point.

Score 80

The stock is projected in 2005 to be at 97% of the target spawning stock biomass (calculated from Table 2.29 of Thompson and Dorn 2004). The harvest rule combined with the estimated recruitments in the past and projected recruitments in the future will cause the stock to rebuild as seen in the previous figures.

If periods of low recruitment again occur, then dropping below the target reference point will again occur, but the control laws will again bring it back. However, if there are many future poor recruitments, then the average recruitment on which the reference points are based would be lower, and the reference points would also be lower. Thus the projected stock size relative to the reference points would be higher

The control rule does not reduce fishing mortality to near zero when the stock falls below the limit reference point, thus a score of 80.

Criterion 1.3 (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.

Indicator 1.3.1 The age/sex/genetic structure of the stock is monitored to detect significant impairment of reproductive capacity.

100 Scoring Guidepost

- Population age/sex structure is well estimated with only insignificant errors.
- Total reproductive capacity for all stock components are estimated.
- Genetic studies of the stock are made at time intervals appropriate to the species.

80 Scoring Guidepost

- Population age/sex structure is based on adequate sampling and verification.
- Ageing errors are estimated and, if significant, accounted for in the stock assessment.
- Trends in reproductive capacity can be measured.
- Genetic studies of the stock have been made.

60 Scoring Guidepost

Population age/sex structure is based on some sampling and verification but is not sufficient to reliably estimate changes in total reproductive capacity

Score 80

The catch sampling in this fishery is extensive primarily as a product of the intensive observer coverage. As discussed in several places earlier, the ageing of Pacific cod is problematic but has recently been restarted as an ongoing part of the stock assessment process. The ageing errors are accounted for internally in the stock assessment model.

Emerging from the stock assessment is an estimate of the total spawning stock biomass. This is the product of the numbers at age from the model, and estimated maturity and fecundity at age. The maturity and fecundity data currently used date back about 10 years, but are in the process of being updated. The major weakness in this system is the low selectivity of large individuals to the survey gear and thus the need to rely on model outputs rather than data to track spawning stock abundance.

Genetic studies have been conducted as discussed in Indicator 1.1.1.3.

This stock meets the 80 guidepost, but because of the inability of surveys to effectively sample larger animals the age/sex structure of the older population, and its genetic composition are not well enough sampled, the score does not meet the 100 guidepost.

Indicator 1.3.2 Information from stock assessment indicates any fishery induced changes in the age/sex/genetic structure that would have significantly impaired reproductive capacity.

100 Scoring Guidepost

There is a high degree of confidence that there are no downward fishery-induced trends in reproductive capacity on local stocks or genetically identified stocks due to changes in the age/sex/genetic structure beyond those changes in reproductive output normal for an exploited population.

80 Scoring Guidepost

There are likely no downward fishery-induced trends in reproductive capacity on local stocks or genetically monitored stocks due to changes in the age/sex/genetic structure beyond those changes in reproductive output normal for an exploited population.

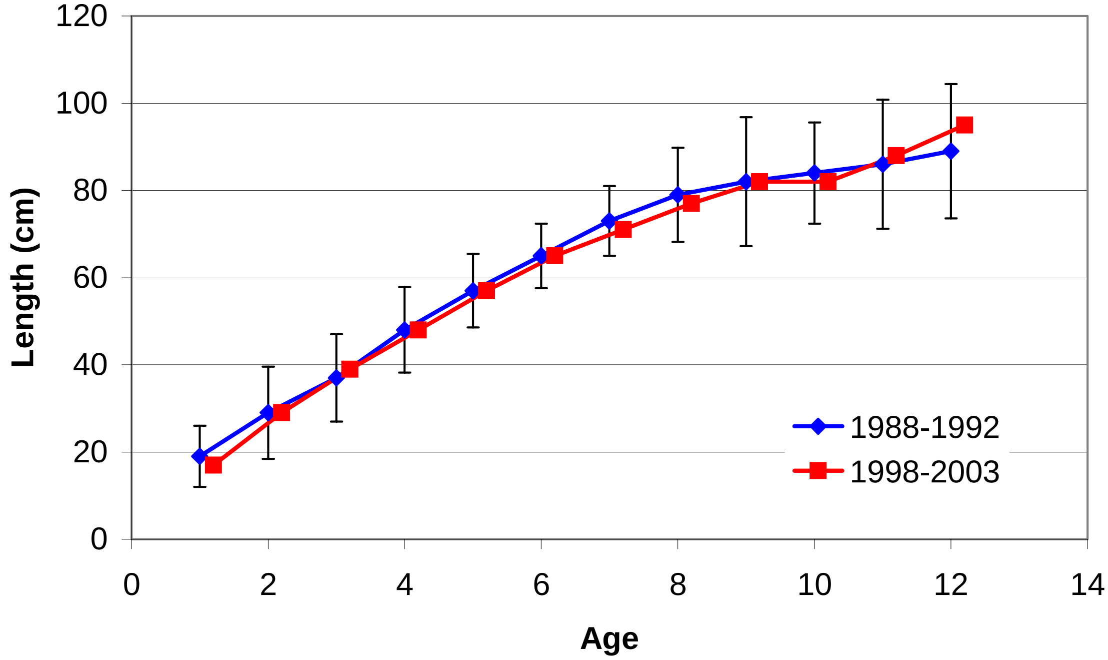
60 Scoring Guidepost

Any fishery-induced trends in recruitment or spawning stock levels have not been shown to be due to changes in the age/sex/genetic composition of the stock.

Score 85

The size at age does not appear to have changed over periods for which ageing data are available (see Figure 14 below from personal communication withThompson). Currently, maturity-at-age is estimated from samples obtained in 1993-1994 although new studies are underway.

Fig. 14. Size at Age for Pacific cod.



From Thompson power point presented at NOAA

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.[1]

We interpret this principle to cover all possible interactions between the fishery and the ecosystem, including both direct and indirect interactions.

Direct interactions of potential concern for longline fisheries are well known and include the incidental capture and mortality of seabirds, turtles and seals, and the effect of these takes on their population status; the bycatch of non-target fish species, particularly grenadiers and elasmobranchs and the effect of these takes on their population status; and the effect of longline gear on the receiving benthic ecosystem, both in respect of drag-related destruction and gear loss. Indirect interactions of potential concern relate to the effect that removal of the target species, or particular life-history stages of the target species, or the target species at particular times or in particular areas, has on dependent or related parts of the ecosystem, particularly on animals or plants having a direct trophic interaction with the target species.

During the MSC assessment of BSAI pollock there was much concern about the effect of fishing a key ecosystem species such as pollock. Much attention therefore focused on ecosystem interactions, specifically the dependency of seals and sea lions on Pollock. These issues will also receive attention in our assessment, but it must be recognized that Pacific cod occupies a rather different position from Pollock in the ecosystem, and that the longline fishery under assessment has quite different direct interactions with marine fauna than the Pollock trawl fishery.

Compared with most other fisheries worldwide the incorporation of the principles of an ecosystem approach to fisheries management are quite advanced in the BSAI. Two very substantial pieces of work have been undertaken on habitats and fisheries impacts in the BSAI and GOA: the PSEIS (Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement; NMFS Alaska Regional Office, 2004) and the EFH EIS (Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska; NMFS Alaska Regional Office, 2005) reports. The Federal observer scheme collects data on target, non-target and protected/endangered species, and the various reporting systems (vessel and observer) together with the fact that 80% of the Pacific cod freezer longline fleet receives 100% observer coverage, provide a high level of data acquisition. The annual assessment document (the SAFE [Stock Assessment and Fishery Evaluation] reports e.g., Thompson & Dorn, 2004) includes specifically a section on Ecosystem Considerations, and although there appears to be no explicit mechanism for incorporation of ecosystem interactions into the determination of ABCs there are a number of

[1] This section relates to the ecosystem in which the fishery takes place only insofar it may be affected by the fishery under certification. Where reference is made to acceptable limits or levels of interaction this refers only to the interaction of the fishery under certification. Interaction on the same ecosystem by other fisheries, or other anthropogenic processes, is not included in the certification assessment. Thus there may be instances where the impacts on the ecosystem as a whole are beyond acceptable limits, but the impacts of the fishery under certification are not. In these cases, the indicators will be used to assess whether the activities of the fishery under certification, on its own, pose an *unacceptable risk* to the receiving ecosystem, not whether they pose an unacceptable *additional* risk to the ecosystem.

other management measures in place which implicitly recognize fishery impacts. In addition there is a SAFE appendix dealing explicitly with ecosystem considerations (e.g., Boldt et al. 2004). These various documents, and interviews and presentations given by NMFS staff, form the primary sources of our assessment. There is a considerable supplementary body of research information relevant to this species and area which is cited in the aforementioned reports.

As will be seen, the **major issues** with regard to Principle 2 are

Benthic interactions: Available evidence suggests that the longline fishery does not create much impact on habitat, both because it is longline and because it is located mostly over the sedimentary substrata of the EBS, but there is actually no empirical or experimental evidence that demonstrates the assumed low impact of longlines on benthic habitats, nor is there a good assessment of gear loss in the fishery or apparently any specific attempts to reduce it.

Endangered/threatened species: Direct and indirect interactions of the fishery with short tailed albatross are well understood, mitigated against, and within determined acceptable limits. Direct interactions with Steller sea lions are negligible but indirect interactions are poorly understood and subject to continuing research and precautionary measures. Direct and indirect interactions with Northern fur seals are thought to be negligible.

Non-target species: The Pacific cod longline fishery contributes the majority of the fishery impact on skates (including rays) and several birds including Northern fulmar, Laysan Albatross, and Black-footed Albatross in the BSAI. The fishery also contributes to fishery impacts on grenadiers and sharks. The catches of skates and fulmars are thought to be within acceptable limits for the species or species complexes, but formal species specific assessments (including for grenadiers) are either not currently possible or are not performed. Nor are the indirect effects of the catch of these species on ecosystem diversity. Skates and sharks are acknowledged by the Council as a priority research area.

2.1(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.

Subcriterion 2.1.1
There is adequate understanding of ecosystem factors relevant to the distribution and life history strategy of the target species.

2.1.1.1 The nature and distribution of habitats relevant to the fishing operations are known.

100 Scoring Guidepost

- The nature and the distribution of all habitats relevant to the fishing operations are known in detail.
- Information is recent.

80 Scoring Guidepost

- Nature and distribution of all main habitats are known in moderate detail.
- Information is recent.
- The distribution of fishing operations is monitored.

60 Scoring Guidepost

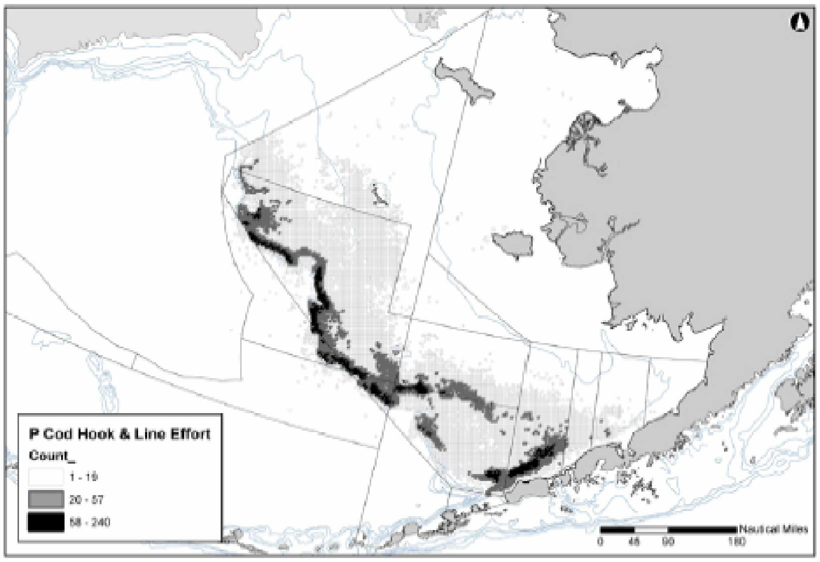
- Some information exists but may not be comprehensive or up to date.
- The distribution of fishing operations is mapped.

Score 90

Pacific cod life history and habitat are well known and described in both the EFH EIS and the PSEIS. Pacific cod is a demersal species that occurs on the continental shelf and upper slope from Santa Monica Bay, California, through the GOA, AI and EBS to Norton Sound (Bakkala 1984). Its greatest abundance is in the EBS but it also has significant abundance in the AI.

Habitats are quite different in these two areas, being essentially soft substrata in the EBS and hard substrata in the AI (EFH EIS Appendix B and section 3.2.1.1.2, see Table 3 below). The distribution of the fishery is shown through aggregation of haul by haul fishing information in the SAFE reports, and in the EFH EIS (Figures 3.4-28 and 29 see below), to be concentrated in the EBS.

Figure 3.4-28. Bering Sea: 1990-2002 Observed Pacific Cod Hook and Line Effort (Sets/25 km^2)



Note: (Sets/25 km^2) = Summed for 1990 to 2002
Source: Cathy Coon, NPFMC Staff, North Pacific Observer Program Data

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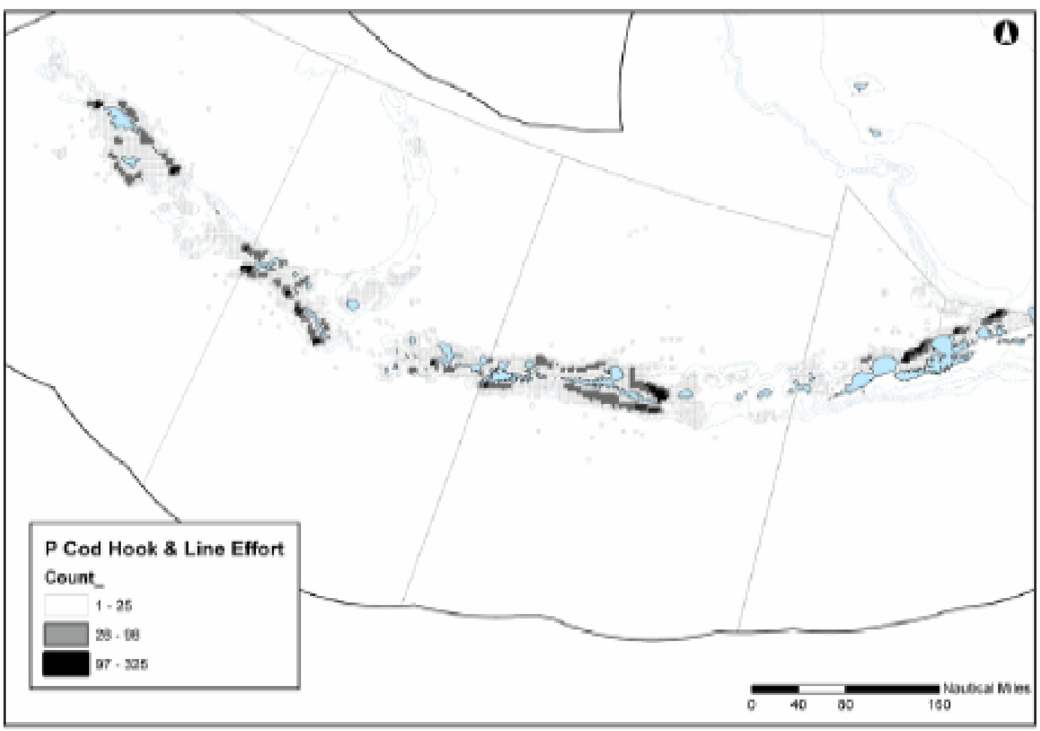
Figure 3.4-29. Aleutian Islands: 1990-2002 Observed Pacific Cod Hook and Line Effort (Sets/25 km^2)



Note: (Sets/25 km^2) = Summed for 1990 to 2002
Source: Cathy Coon, NPFMC Staff, North Pacific Observer Program Data

In the late winter, Pacific cod converge in large spawning masses over relatively small areas. Major aggregations occur between Unalaska and Unimak Islands, in the so-called “cod alley”, southwest of the Pribilof Islands, and near the Shumagin group in the western GOA (Shimada and Kimura 1994). Spawning takes place in the sublittoral–bathyal zone near the bottom, the area of the continental shelf and slope about 40 to 290 m deep. The eggs sink to the bottom and are somewhat adhesive (Hirschberger and Smith 1983). Larvae are epipelagic, moving down the water column as they grow. Juvenile fish occupy shallower areas of the EBS, mature fish being concentrated on the outer continental shelf.

Tagging studies show that cod migrate seasonally over large areas (Shimada and Kimura 1994). Recent tagging studies aimed specifically to investigate cod use of spawning grounds and the Steller sea lion exclusion zones around Unimak and adjacent islands have confirmed that there is rapid movement through “cod alley” into the EBS. For instance, most cod tagged within the trawl exclusion zones around Unimak and Amak islands had moved out of the zones after only 8 days at liberty (Shi et al., pers comm.). Furthermore, very few cod tagged in this study had moved into the GOA, confirming that although not genetically distinct (Grant et al. 1987) the BSAI and GOA stocks are effectively separate for management purposes.

The EFH EIS presents quantitative and distributional data on all benthic habitat types in the GOA and AI relevant to the longline fishery, and reviews literature on the effects of longline gear on habitat. Longlines can impact benthic habitat by catching erect hard epifauna on their hooks, or by snagging such animals on the line during hauling. A “long-term effects index” (LEI) is developed, which is a function of the intensity of fishing in different habitat types, the sensitivity of habitat types to disturbance by a particular fishing gear (the proportion by which a feature’s function is reduced by one pass of the gear used in the fishery) and the recovery time for damage caused to a particular habitat feature. Clearly the most sensitive habitat types are those hard substrata containing erect epifauna such as gorgonians and sponges found in the AI, but there are relatively few sets by the cod longline fishery in this area due to the lower density of cod in the area and the numerous fishery exclusion zones around islands (PSEIS). The least sensitive habitat to longline impacts is the EBS, which is mostly sand/mud or mud. These differences were reflected in the long term effects index of the EFH EIS (Figure 2.1) [not shown] which estimates the effect of longlines to be negligible in the EBS and GOA, and to have an effect index of 0.1% in the AI.

Table 3. Longterm Effects Index calculated by the EFH EIS for the EBS, GOA and AI. Source: EFH EIS Table B.2-10

Table B.2-10. Long-term Effect Indicies (LEI*) Indicating the Effects of Fishing on Habitat Features by Fishery for the Features with the Highest LEIs in Each Region

Bering Sea (soft substrate)	Sand/Mud Biostructure	Slope Biostructure
Pollock Pelagic Trawl	4.6%	7.2%
Yellowfin Sole Trawl[1]	2.9%	0.2%
Flathead Sole/Flatfish Trawl[1]	1.8%	1.6%
Rock Sole Trawl[1]	0.9%	0.2%
Pollock Bottom Trawl[1]	0.4%	0.6%
Pacific Cod Trawl[1]	0.2%	0.4%
Sablefish/Turbot Trawl[1]	0.1%	0.7%
Pacific Cod Longline	0.0%	0.0%
Rockfish Trawl[1]	0.0%	0.0%
Pot	0.0%	0.0%
Sablefish/Turbot Longline	0.0%	0.0%
Total	**10.9%**	**10.9%**
[1] Total Bottom Trawl	6.3%	3.7%

Aleutian Islands (hard substrate)	Shallow Biostructure
Pacific Cod Trawl	4.2%
Atka Mackeral Trawl	2.5%
Sablefish/Turbot Trawl	0.2%
Rockfish Trawl	0.2%
Pollock Bottom Trawl	0.1%
Pacific Cod Longline	0.1%
Sablefish/Turbot Longline	0.0%
Pot	0.0%
Pollock Pelagic Trawl	0.0%
Total	**7.3%**

* LEI - Estimated eventual reduction in a class of habitat feature if recent fishing intensity and distribution were continued until fishing effect rates and habitat recovery rates equalized (equilibrium).

The level of knowledge about all habitats is clearly very high, and the development of the LEI puts these fisheries at the forefront of attempts to quantify the effect of fisheries on habitat. The fishery clearly scores more than 80 Scoring Guidepost on this indicator. However, although the EFH EIS attempted to quantify impacts on hard substrata in the AI, there is still relatively little experimental information on the long term effects of removal of long-lived gorgonian and sponges on the relatively rich hard substrata communities of the AI, which brings the score down from 100 to 90.

Indicator 2.1.1.2 Information is available on the position and importance of the target species within the food web.

100 Scoring Guidepost

Quantitative information is available on the position and importance of the target species within the food web at key life stages.

80 Scoring Guidepost

Qualitative and some quantitative information are available on the position and general importance of target species in the environment at key life stages.

60 Scoring Guidepost

Key prey, predators and competitors are known.

Score 100

The diet of Pacific cod is well studied; the PSEIS reports in section 3.5.1.2. page 3.5-15,

"*Pacific cod is an opportunistic feeder that feeds both in the water column and in benthic areas (Yang and Nelson 2000).*

In the BSAI and GOA, in terms of percent occurrence in stomach contents, the most important items were polychaetes, amphipods, and crangonid shrimp. In terms of numbers of individual organisms consumed, the most important items were euphausiids, miscellaneous fish, and amphipods. In terms of weight of organisms consumed, the most important items were pollock, fishery offal, and yellowfin sole.

Small Pacific cod were found to feed mostly on invertebrates, while large Pacific cod are mainly piscivorus (Livingston 1991b). In studies conducted on GOA Pacific cod, polychaetes and cephalopods were the most frequently found invertebrates in stomach contents. However, pandalid shrimp were more important in terms of percentage of total stomach contents weight. GOA Pacific cod also consumed large amounts of tanner crabs (Yang and Nelson 2000).

Predators of Pacific cod include Pacific halibut, salmon shark, northern fur seals, Steller sea lions, harbor porpoises, various whale species, and tufted puffins (Westrheim 1996).

The PSEIS also presents a figure of trophic interactions (Figure 15)

Figure 15. Trophic interactions in the Bering Sea. Source, Figure 3.5-1, Appendix A (part 3), PSEIS (NOAA, 2004).

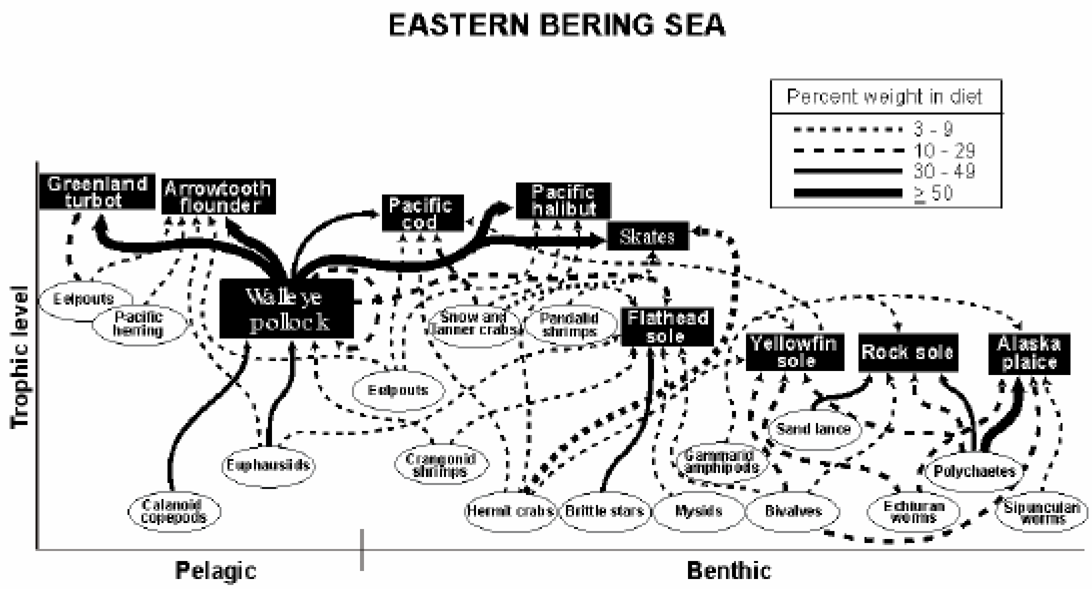


Figure 3.5-1. Trophic interactions of key eastern Bering Sea groundfish. Source: NMFS.

The GOA/AI ecosystem has been modeled quantitatively using ECOPATH/ECOSIM, utilizing more than 40,000 Pacific cod stomach samples (Kerim Aydin, pers comm. – presentation). Sensitivity tests based on these models are described in section 2.1.1.3. However, the level of quantitative knowledge available about the EBS ecosystem, and particularly the position of Pacific cod within it, is very high and the fishery scores 100.

The position of Pacific cod in the ecosystem is kept under review in the annual SAFE documents, where there are sections on the effect of the ecosystem on Pacific cod and of the fishery for Pacific cod on the ecosystem. The 2004 report, for instance, states "*The prey and predators of Pacific cod have been described or reviewed by Albers and Anderson (1985), Livingston (1989, 1991), and Westrheim (1996). In terms of percent occurrence, the most important items in the diet of Pacific cod in the BSAI and GOA are polychaetes, amphipods, and crangonid shrimp. In terms of numbers of individual organisms consumed, the most important dietary items are euphausids, miscellaneous fishes, and amphipods. In terms of weight of organisms consumed, the most important dietary items are walleye pollock, fishery offal, and yellowfin sole. Small Pacific cod feed mostly on invertebrates, while large Pacific cod are mainly piscivorous. Predators of Pacific cod include halibut, salmon shark, northern fur seals, Steller sea lions, harbor porpoises, various whale species, and tufted puffin. Major trends in the most important prey or predator species could be expected to affect the dynamics of Pacific cod to some extent.*"

Indicator 2.1.1.3 There is information on the potential for the ecosystem to recover from fishery related impacts.

100 Scoring Guidepost

Detailed information is available on ecosystem dynamics and the functional relationship between key elements, allowing a good assessment to be made of the potential for affected elements of the ecosystem to recover from fishery related impacts.

80 Scoring Guidepost

The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are understood, allowing reasonable assessment of recovery potential.

60 Scoring Guidepost

Key elements of the functioning of the ecosystem, relevant to the fishery, are identified.

Score 90

Two considerations are relevant to this indicator: effects on benthic ecosystems and effects on general and pelagic ecosystems.

The EFH EIS, described previously, has assessed the benthic habitat impact of the Pacific cod longline fishery to be negligible in all areas except the AI. Some more experimental work could be done in the AI to test the assumptions of the LEI, especially in terms of sensitivity and recovery time, but as the fishery is primarily active in the EBS rather than the AI its effects on these ecosystems is likely to be extremely limited.

In terms of the wider ecosystem, a number of monitoring and model-based approaches are currently being taken to assess this. NMFS has built three levels of predictive models to assess the effect of different harvest strategies on cod and the BSAI ecosystem. The first is a model to examine multispecies gear and bycatch interactions, constructed for the PSEIS (Section 4.1.5), which does investigate gear interactions but does not model species (predator-prey) interactions. A more complex model based on an MSVPA approach has also been developed to investigate the biological interactions between selected fish species (Pollock, cod, turbot, yellowfin sole, rock sole, herring, Atka mackerel). The most complex model is that developed using ECOSIM/ECOPATH (Aydin et al. 2002). This model suggests that currently gadoid catches are a relatively low fraction of gadoid production in the EBS, about 20%. It also shows that mammalian predators contribute a relatively small fraction of natural mortality for Pacific cod.

ECOSIM simulations (this paragraph presents some results from the presentation given specifically for the MSC assessment by SCS by Kerim Aydin) suggest that in the EBS, a 10% increase in Pacific cod mortality (i.e. a 10% increase in fishing mortality) would lead to relatively small ecosystem effects: the largest being increases of between 3 and 4% in greenling and bairdi crab abundance. In the AI, where Pacific cod is a more important ecosystem component (AI has 1/3 of the biomass that is present in the EBS, but at 3 times the density), ECOSIM simulations suggest that a 10% increase in Pacific cod mortality would lead to more widespread ecosystem effects – increases of about 4% in rex sole, sablefish, arrowtooth flounder, greenling, sleeper shark and some sculpins and a very small negative effect on starfish. Note that these ecosystem effects are relatively limited primarily because for most of the Pacific cod life cycle it is a top predator.

The annual BSAI SAFE report contains a chapter that details ongoing research and findings on the overall health of the ecosystem (Boldt et al., 2004). SAFE ecosystem reports from 2003 and 2004 provide extensive lists and reviews of a broad range of ecosystem indicators monitored by NMFS. Among the indicators are 1) indicators of the physical environment: temperature and ice cover, drift trajectories, climate; 2) habitat indicators: HAPC, effects of fishing on the sea floor, primary research on essential fish habitat; 3) zooplankton; 4) forage fish; 5) trends in spawner per recruit; 6) fish growth; 7) trends in populations of other species including nontarget species, marine mammals and birds; and 8) traditional indicators, such as species richness, evenness and diversity. Although monitoring of these indicators is ongoing, it is not clear how contraindications from them would be included into management rules to allow or predict the likely recovery of these ecosystem components.

Although there is a large amount of information on this indicator, experimental evidence assessing the impact of longlines on benthic habitats, as well as information on the potential for recovery of those habitats, is lacking. The EFH-EIS found no studies that quantitatively assessed the impacts of longlines on seafloor habitat features (Appendix B, section B.2.4.2.3). This is only really important as far as the AI is concerned, and is of minor significance especially since only 3% of the longline catch is taken from the AI (Thompson & Dorn 2004). Longline effort is concentrated north of Unimak Island, and along the shelf edge in the central eastern Bering sea (Thompson & Dorn 2004, Boldt et al. 2004).

Subcriterion 2.1.2
General risk factors are adequately determined.

2.1.2.1 Information is available on the nature and extent of the non-target species caught by the fishery. This includes all non-target species – invertebrates, fish, mammals, reptiles, birds etc.

100 Scoring Guidepost

Accurate records by vessel are kept of distribution, abundance, ecology, size, age, and sex composition, where appropriate for by-catch species caught in the fishery.

80 Scoring Guidepost

- Information is available on non-target species affected by the fishery including their distribution and abundance.
- If obtained by sampling, this is adequate to produce accurate data.

60 Scoring Guidepost

The main non-target species have been identified, and trends in abundance are assessed.

Score 90

Regulation (50 CFR part 679.5) as well as others requires weight or numbers of target (including non-cod species that are targets in other fisheries, such as rockfish) and nontarget species bycatch caught in the BSAI Pacific cod freezer longline fishery to be recorded in the DCPL maintained by the vessel operator and reported to NOAA Fisheries (Tagart et al. 2005). This requirement includes non-target species including invertebrates, fish, mammals, reptiles, and birds.

The federal onboard observer program also records bycatch and collects biological information on many bycatch species. The extent of the observer program is currently being revised to collect more information on non-target bycatch species (Martin Loefflad, pers comm.). The observer program is kept under constant review, with the next major review due in 2006. Observers are directed to randomly sample at least 1/3 of each longline set monitored for bycatch. Observers are able to monitor from 50 to 100 percent of the sets retrieved during a trip, and currently monitor 52% by catch weight of all longline sets in the whole fishery. Eighty percent of the BSAI freezer longline fleet targeting Pacific cod has 100 percent observer coverage (being greater than 120' LOA) and the remaining 20 percent has 30 percent observer coverage (being between 64 and 120' LOA). Although the placement of observers on the 30% vessels is not random, the effect of this is likely to be minimal considering that the majority of the fleet has observers on for each fishing trip. The federal observer data provides the best estimate of abundance and distribution of bycatch. This information along with the logbook data has been used to conduct detailed analyses of abundance and distribution of bycatch in the fishery both temporally and geographically, and in assessments (Gaichas et al. 2004).

The observer system operated in BSAI and GOA fisheries is very comprehensive. Only the lack of 100% observer coverage on all vessels and the current lack of detailed biological information from all bycatch species (likely to be rectified by the upcoming observer review and major revisions to the database) reduce the score.

2.1.2.2 Information is available on the extent of discards (the proportion of the catch not landed).

100 Scoring Guidepost

Accurate information is available on the extent and proportional survival by age/size of all discards and these estimates are incorporated into assessments of impact on non-target species, or the entire catch is landed.

80 Scoring Guidepost

- Information is available to allow reliable estimates of discard to be calculated and interpreted.

- Qualitative information on discarding and discard mortality is used to assess impacts on non-target species.

60 Scoring Guidepost

Information is available on the extent of discarding, including a species list and assessment of the main species represented, but no information is available on discard survival/mortality

Score 80

Vessel operators are required to record discards from all sets. Bycatches include some quota target species but mostly include species groups that are defined as nontarget and “Others”. Species discarded in the BSAI freezer longline directed cod fishery are primarily several species of skates (although some skates are processed), sculpins, grenadier, sleeper shark and halibut. The latter is a prohibited species and subject to stringent catch limits.

Catch limits exist for Other species, but until 2004, the Other species TAC has never been exceeded in the BSAI or the GOA with the current composition of the category. In 2004, the BSAI open access TAC of 23,124 t was exceeded as of October 23 (Gaichas et al. 2004; AKRO Catch Accounting web page, http://www.fakr.noaa.gov/2004/car110_bsai.pdf), so all Other species were put on prohibited status. This meant that no further retention was allowed, but catch and discard can continue up to the Other species OFL of 81,150 t).

Because annual Other species catches are reported in aggregate, catches by species group or individual species must be estimated using data reported by fishery observers. Estimates of discards by species are therefore additionally made by onboard observers. The accuracy of catch estimates for groups or species within the Other species complex depends on the level of observer coverage in a given fishery, and the longline fishery does not have universal 100% coverage. Catches and discards of Others are raised to group and species level by methods described in Gaichas et al. (2004).

Extensive studies have been conducted and results reported by the International Pacific Halibut Commission on halibut discard mortality in the BSAI directed cod fishery [Trumble et al. 2000]. This mortality rate is applied to halibut bycatch to determine total halibut mortality in the fishery. This halibut mortality is reported back to industry on a weekly basis and tabulated against a halibut mortality cap placed by management on the BSAI directed cod fishery using longline gear. This halibut mortality is also deducted from the halibut optimum yield as a step in determining the directed fishing allocation of halibut in the BSAI halibut management areas. No other discard mortality studies appear to have been conducted. Other bycatch is therefore assigned a 100 percent fishing mortality and counted against annual catch quotas, which is at least conservative because actual discard mortality may be lower than this especially for skates.

Catches and discards are sampled and recorded by the Federal observer program, which for 80% of the fleet includes observations on 100% of the trips. This program records biological information on many, but not all non-target species. Observer data are used to separate the aggregate species complex catch data into species where possible, but even the observer data are limited in resolution to species because of the difficulty of identifying some groups, especially grenadiers and corals, to species. A major category of discards from the longline fleet is sea pens/whips and anemones (presumably this category includes coralline algae and hydroids). The bycatch of these organisms from longline vessels in the EBS varies between 100 and 200 t, and is about 60% of the total discards of all groundfish fisheries. The fishery does not appear to catch sponges in any quantity.

Assessments are conducted on some discard/bycatch species, principally skates and sculpins, though currently these assessments are rudimentary and based on species complexes, not individual species assessments (Gaichas et al. 2004). No assessment is performed on grenadiers, although the SAFE ecosystem chapter contains some advice regarding these species (see section 2.1.5.1).

In conclusion, although reasonable data exist on the extent of discarding, the limitation on observer coverage and identification to species and species groups, and the current extent of assessments, reduces the score of this indicator.

2.1.2.3 There is information on any unobserved fishing mortality on target or other species (i.e. sources of mortality other than those above such as IUU fishing).

100

- Research has been carried out on unobserved fishing mortality allowing quantitative estimates to be made (or it is known that significant unobserved mortality does not occur).
- Monitoring is continuous.

80 Scoring Guidepost

- Information from existing work has allowed qualitative estimates of unobserved fishing mortality to be made.
- Monitoring is occasional or sporadic.

60 Scoring Guidepost

Areas of potential unobserved fishing mortality are identified but no further information is available.

Score 80

Possible unobserved mortality may arise from IUU fishing; from catches of target species in other fisheries; and from unseen gear effects such as ghost fishing. There is believed to be no IUU fishing in the BSAI region. The US Coastguard regularly patrols the BSAI area, up to the border with Russia and the area of the donut hole (Mike Ceirne, 17 Coast Guard district, Juneau, pers comm). Incursions over the US-Russian border have dropped from 52 in 2001 to below 10 in 2004 to 30 September (USCG 2004). The same mission patrolled the Steller sea lion Critical Habitat Areas (753 cutter hours and 217 aircraft hours during this period) and reported no significant violations. In the BSAI there are typically 400 boardings a year generating 40 violations. Ten Pacific cod vessels, 7 of them longliners, were boarded in this time and there was one violation for logbook errors. These violations do not amount to large scale IUU fishing on Pacific cod.

Regarding other fisheries, since Pacific cod is a target species its catches, and the biological characteristics of these catches, is monitored and reported by the vessel and observers. Unobserved fishing mortalities could be associated with very long soak times, allowing hooked fish to be eaten by isopods and amphipods, leaving only skeletons or leaving sand flea eaten carcasses to simply fall free of hooks and be undetected on gear retrieval. The soak time of deployed gear in the longline fishery is typically limited to 4-8 hours with exceptions being up to 12 hours (He and Howse 1994, referenced in Tagart et al 2005). The potential for unobserved fishing mortality from this source is therefore low.

We have found it difficult to obtain information on the quantity of gear lost by the fishery, or on its potential ghost fishing. It is suspected that the potential for ghost fishing is low. For instance, longlines lost in the EBS are thought to sink into the mud/sand substratum fairly rapidly, and to stop fishing once bait has been removed by scavenging crustacean (Tagart, pers comm), but additional information is required. However, this has not been experimentally demonstrated, and we have received little data to support it. There is also the potential in longline fisheries for discarded hooks, especially if discarded in offal, to cause additional mortality of predators, and for fish to be lost from the line before they can be recorded, this being a potential source of unseen additional mortality.

Therefore the fishery meets the 80 Scoring Guidepost.

Subcriterion 2.1.3
There is adequate knowledge of the effects of gear-use on the receiving ecosystem and extent and type of gear losses.

2.1.3.1 There is adequate knowledge of the physical impacts on the habitat due to use of gear.

100 Scoring Guidepost

- The physical impacts on the habitat due to use of gear have been studied and quantified, including details of any irreversible changes.
- Habitat perturbations appear sustainable.

80 Scoring Guidepost

- Impacts of gear use on the habitat are identified including extent and location of use.
- Effects of habitat perturbations estimated and appear stable.

60 Scoring Guidepost

Main impacts of gear use on the habitat are identified including extent and location of use.

Score 80

It is normally assumed that longlines have minimal impact on benthos, particularly in comparison to trawl gear. Morgan and Chuenpagdee (2003, cited by Tagart et al 2005) conducted a workshop and surveyed scientific experts to produce a qualitative appraisal of the impacts of fishing on habitats. Workshop participants listed the following impacts for longline gear: "*Damage to habitat caused by bottom longlines is limited because the gear is small in weight and area. However, hauling the lines from the bottom may cause the hooks to snag, and the lines may cause abrasions or entangle rocks, coral, or structural organisms such as sponges or gorgonians. When lines are hauled mechanically, this damage is magnified.*" Experts ranking the impacts of fishing on habitat tend to rank bottom longline gear as moderately-low or low impact.

The EFH EIS long-term effects index suggests that the impact of longlines is low, due to a combination of small areal impact and the low perceived impacts on benthic organisms on mud/sandy substrata of the EBS where most longline fishing for Pacific cod takes place. However, the information base for this assessment is not good. A literature review concluded that (Section 3.4.3.2.4) *Very little information exists regarding the effects of longlining on benthic habitat, and published literature is essentially nonexistent. Observers on hook and line vessels have recorded bycatch of HAPC biota. Bycatches of benthic epifauna by Pacific cod fisheries using longline gear off Alaska were comparable to those using trawl gear (NMFS 2000d). Bycatches of anemones and seawhips/pens were higher for longlines than trawls, while trawl bycatches were higher for corals and sponge. On a regional scale, these removals do not represent a large portion of the population. For example, anemone abundance on the EBS shelf, likely underestimated due to the sampling trawl not catching 100 percent of anemones in the trawl path, was estimated at 26,570,000 kg (McConnaughey, B., unpublished data) of which the 3-year (1997 to 1999) longline bycatch of 86,063 kg was at most 0.3 percent.* It concluded that *current observations only demonstrate the potential, and some mechanisms for, effects of longlines on benthic habitat, particularly structure-forming animals. Those observations are insufficient to assess whether habitats are significantly altered at either local or regional levels or whether they vary in fisheries that use different gear or methods (i.e., setting mainline under tension). Important missing information includes the area of seafloor affected by longlines, the proportion of animals in that area that are affected, the severity of effects, rates of recovery, and the importance of affected structures in the function of EFH.*

In 1996 the Alaska Fisheries Science Center began a project to investigate the effects of fishing on benthic habitat. At the time of writing (October 2005) none of their reports had addressed the issue of longlines although on at least one survey in SE Alaska discarded longlines were seen on rock pinnacles and damage to red tree corals [attributed to longlines] was evident (Heifetz 2003).

The weighted average LEIs for the BSAI were:

Habitat Feature	BSAI
Infauna Prey	2%
Epifauna Prey	1%
Living Structure	10%
Non-living Structure	2%
Hard Coral	2%

In terms of living structure, the highest impacts were in the area of Pacific cod spawning aggregations north of Unimak Island, but these are overwhelmingly due to the effect of trawls not longlines.

Regarding the effects of fishing on habitats supporting Pacific cod, the EFH EIS concludes (section B.3.3.2) *Fishing's effects on the habitat of Pacific cod in the BSAI and GOA do not appear to have impaired either stocks' ability to sustain itself at or near the MSY level. When weighted by the proportions of habitat types used by Pacific cod, the long-term effect indices are low, particularly those of the habitat features most likely to be important to Pacific cod (infaunal and epifaunal prey).* However, there are likely to be some effects of coral habitat destruction on other fish species. Boldt et al (2004) describe the importance of coral and sponge habitats for juvenile rockfish, particularly Pacific Ocean perch in the AI.

In terms of scoring, there is clearly some information on the effects of gear use and the EFH long term effects index is an attempt to identify long term perturbations. However, there is a lack of direct studies on the impacts of longlines on benthic habitat. All the indications, especially the fact that most longlining is undertaken in the BS not on the more sensitive AI hard substrata habitats, suggest that the impact of longlining is low. However, more work on the impacts on habitat of longline gear is certainly required before it can be said that physical impacts on the habitat due to use of gear have been studied and quantified. Thus in our view the fishery meets the 80 guideline.

2.1.3.2 Any gear lost during fishing operations is documented. There is adequate knowledge of gear losses and their impacts on the ecosystem.

100 Scoring Guidepost

- There is detailed knowledge of the type, quantity and location of gear types lost during fishing operations, and its destiny in the receiving ecosystem
- The impact of gear loss on target and non-target species has been measured and shown to have negligible effects on habitats, ecosystems or species of concern.

80 Scoring Guidepost

- There is some knowledge of the type, quantity and location of gear lost during fishing operations and its destiny in the receiving ecosystem.
- Estimates made show that losses do not cause unacceptable impacts on the ecosystem.

60 Scoring Guidepost

Some recording of gear losses takes place.

Score 75

It is reported by Tagart et al (2005) that *NOAA Fisheries requires that vessel operators record the type of longline gear being used, the length of a skate, the number of hooks per skate of gear deployed and the number of skates of gear lost for each longline set conducted in the federally managed Pacific cod longline fishery in the BSAI. The start and end latitude and longitude and the depth range of each set are also recorded. Additionally, federal fishery observers also record both effort and gear loss for those sets monitored. This information provides a reasonable estimate of gear loss in the BSAI Pacific cod freezer longline fishery.* However, to date an analyses of these data, does not seem to be available. There also seems to be no information available on the discard of hooks in offal, which was identified as a significant problem in the South Georgia toothfish fishery (Holt et al 2004)

Also as reported above, whilst prevailing opinion (and the results of the EFH EIS) hold that the impacts of longlining on benthic habitat is likely to be minimal, particularly since the bulk of the Pacific cod fishery takes place over soft EBS substrata, this conclusion is based on little or no empirical information. Furthermore, there is very little information available on the real impact of the bycatch and discards of corals and sea whips.

The level of information available on this issue falls short of the 80 guideline.

Condition

Institute a monitoring program for gear lost (including lines and hooks discarded in offal) in the longline fishery and a study to assess the impacts of such gear loss on the receiving ecosystem, particularly its effects on benthos. If the results of these studies suggest that particular fishing areas are creating significant and unacceptable impacts on sensitive benthos, identify ways of reducing gear loss and implement a program to monitor improving performance in this aspect of operations.

Subcriterion 2.1.4
Strategies have been developed within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem.

Indicator 2.1.4.1 Levels of acceptable impact are determined and reviewed.

100 Scoring Guidepost

Levels of acceptable impact for key populations (such as of indicator species) and habitats have been accurately estimated and are subject to frequent review.

80 Scoring Guidepost

Levels of acceptable impacts (e.g. biological reference points) for key aspects of the ecosystem within main fishing areas have been estimated and are regularly reviewed.

60 Scoring Guidepost

There is sufficient information to determine acceptable impacts for main target and non-target species and habitats.

Score 75

Levels of acceptable impact have been determined for many impacted species, but not all. For instance, there are SAFE reports for all managed groundfish species, and some nontarget species. Managed species annually assessed for abundance include: pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, Arrowtooth/Kamchatka flounder, rock sole, flathead sole, Alaska plaice, Other Flatfish, Pacific ocean perch, Northern rockfish, Shortraker/Rougheye rockfish, Other Rockfish, Atka mackerel, Squid and Other species, and Sharks. Prohibited species catches of crab (snow and Tanner crab, king crab, hair crab), halibut, salmon, and herring are also monitored. Impacts and acceptable limits have been determined for some protected species, such as short tailed albatross, but have not been determined for the bird that is most severely affected by the fishery, the Northern fulmar.

In 2003 in the BSAI, the bycatch rate for all seabird species was 0.02 birds per 1,000 hooks and the estimate of the number of birds caught was 5351 birds (Fitzgerald et al. 2004). The species composition for seabird bycatch in the BSAI longline fishery is 59% fulmars, 20% gull species, 12% unidentified seabirds, 4% albatross species, 3% shearwater species, and 2% ‘all other’ species.

Due to a lack of published population data, there is some uncertainty associated with the population consequences of seabird bycatch in the bottom longline fisheries of the BSAI and GOA. Population assessments are currently underway by the U.S. Fish and Wildlife Service (USFWS) for several albatross species, but to our knowledge acceptable catch limits are not currently made. The longline fishery is, however, unlikely to be creating a major problem. Laysan and black-footed albatross bycatch in the Alaskan bottom longline fisheries is estimated to be 0.02% and 0.004% of the most recent population estimates of 874,000 and about 300,000 respectively (Fitzgerald et al. 2004). BSAI longline catches are not as important for these species as catches in trawl fisheries in the BSAI (Laysan) or longline fisheries in the GOA (black-footed).

For northern fulmars, the current bycatch levels in the BSAI are estimated to be 1.4% of the population estimate of 2.1 million birds (1998) (Fitzgerald et al. 2004) but most of this catch is taken in the trawl fleet (and mitigation measures are under development for this fleet; Melvin et al 2005). The longline fishery catch of fulmars is about 0.15% of the recent population estimate.

An annual Ecosystem Chapter is provided with the SAFE, in which 34 time series are monitored routinely and analyzed by anomaly trends. These include indices of BSAI oceanography, productivity, trophic levels, plankton biomass and productivity, forage and other fish population trends and seabird breeding success. Indices are not specifically related to the Pacific cod longline fishery, nor are the indices indexed with respect to levels of acceptable impact.

The Pacific cod SAFE assessment (Thompson & Dorn 2004) contains more specific information on ecosystem effects of the fishery. Specific comments are made about other bycatch species, Steller sea lions and seabirds, although no acceptable limits of catch are defined for these latter two groups. However, for sea lions we note that sea lions are not caught as bycatch in the longline fishery, and further we note the BiOp conclusion that directed fishing for Pacific cod would be prohibited if Steller sea lion biomass fell below B20% (NMFS 2003).

Only certain species (such as sharks, skates and sculpins) benefit from a specific assessment (Gaichas et al 2004, Courtney et al 2004). Thompson & Dorn (2004) identify the need for further work to identify an acceptable level of impact (sleeper sharks and anemones). There are other species that do not yet seem to have been considered by any group, but are caught in considerable numbers by the longline fishery. These are so-called non-specified species. There is currently no management or monitoring of any species in this category, and the retention of any non-specified species is permitted. No reporting is required for non-specified species, and there are no catch limitations or stock assessments (PSEIS 2004 section 3.5.5). The one species of most concern is grenadier, of which several hundred may be taken each year by the longline fishery (PSEIS Table 3.5-68).

In summary, for some of the affected species levels of acceptable impacts have been determined and are regularly reviewed. For the ecosystem in general, and for some other species that might be considered key in respect of this fishery, such impacts are not regularly reviewed and limits have not been set. The only species that are not currently part of such a review, and for which longline catches are significant, are the Northern fulmar. Other species (such as skates and sharks) are currently being investigated by NMFS which will include (or already includes) an estimate of acceptable catch levels.

Condition

Acceptable levels of catch are not currently calculated for some key species, of which the most important is Northern fulmars. Assessments of the status of this species should be extended to specifically identify acceptable bycatch levels and confirm that current bycatch levels are within these acceptable limits.

Indicator 2.1.4.2 Management objectives are set in terms of impact identification and avoidance/reduction.

100 Scoring Guidepost

- Tested management objectives are set to detect and reduce impacts.
- These are designed to adequately protect ecosystems, habitats and populations of target and non-target species and keep impacts within assessed acceptable limits.
- Management reference points take quantitative and explicit account of ecosystem effects (see 1.1.3.1).

80 Scoring Guidepost

- Management objectives are set to detect and reduce impacts, although these have not been fully tested.
- These are designed to adequately protect key aspects of the ecosystem within main fishing areas.
- Management reference points take qualitative account (implicit or explicit) of ecosystem effects (see 1.1.3.1) if they are relevant.

60 Scoring Guidepost

- Limited management systems exist in terms of impact identification and avoidance/reduction.
- Ecosystem effects are not implicitly or explicitly taken account of in setting reference points for the target species.

Score 80

The Pacific cod fishery is managed under the umbrella of the BSAI Groundfish Fishery Management Plan (FMP). The FMP is required under the terms of the Magnuson-Stevens Act. Within the Magnuson-Stevens Act are 10 National Standards that set the guiding principles for fisheries management (see PSEIS Appendix B, Section B.2.7.1; Section 301 of the Magnuson-Stevens Act; final rule implementing National Standards (63 FR 24212) and 50CFR600 (Tagart et al 2005). The goals of the FMP include minimizing impacts of fishing strategies on other fisheries and the environment, and on prohibited species, and mention seeking to maintain productive capacity of the habitat required to support the groundfish fishery. The Ecosystem chapter (Boldt et al 2004) reports on trends associated with the ecosystem goal of the FMP:

1. Ecosystem Goal: Maintain Diversity
a. Time Trends in Bycatch of Prohibited Species
b. Time trends in groundfish discards
c. Time Trends in Non-Target Species Catch (not updated for 2004)
2. Ecosystem Goal: Maintain and Restore Fish Habitats
a. Areas closed to bottom trawling in the EBS/ AI and GOA
b. Hook and Line (Longline) fishing effort in the Gulf of Alaska, Bering, Sea and Aleutian Islands

c. Groundfish bottom trawl fishing effort in the Gulf of Alaska, Bering Sea and Aleutian Islands
d. Groundfish pelagic trawl fishing effort in the Eastern Bering Sea
3. Ecosystem Goal: Sustainability (for consumptive and non-consumptive uses)
a. Trophic level of the catch
b. Status of groundfish, crab, salmon and scallop stocks
c. Total annual surplus production and overall exploitation rate of groundfish
d. Ecosystem indicators for the bottom trawl fish community of the eastern Bering Sea (not updated for 2004)
4. Ecosystem Goal: Humans are part of ecosystems
a. Fishing overcapacity programs
b. Groundfish fleet composition

The Council is reasonably responsive to ecosystem concerns when there is evidence that action needs to be taken. Some of these actions have been taken following internal review, for example the requirement to use streamer lines on longline vessels, the inclusion of Ecosystem sections to the SAFE reviews and the assessments of skates, sharks and other non-target species. The PSEIS and EFH EIS were triggered as a result of the requirements of Marine Mammal Protection Act and National Environmental Policy Act (NEPA), although it took external pressure through lawsuits to create the momentum for what are extremely comprehensive reports. One of the outcomes was the closure of areas to protect Steller sea lions, their prey and habitat close to their haul-outs, and experiments to determine the dependency of Steller sea lions to local Pacific cod abundance (Thompson & Dorn 2004).

The response to the EFH EIS is instructive in this regard. The EFH EIS evaluates alternatives and environmental consequences for three actions: (1) describing and identifying EFH for fisheries managed by the Council; (2) adopting an approach for the Council to identify Habitat Areas of Particular Concern within EFH; and (3) minimizing to the extent practicable the adverse effects of Council-managed fishing on EFH. The Council reviewed the Preliminary Final EIS at its February 7-14, 2005 meeting and selected final preferred alternatives for each of the three actions. The preferred alternatives are (1) Alternative 3 - Describe and identify EFH as the revised general distribution; (2) Alternative 3 - Adopt the site-based approach for identifying Habitat Areas of Particular Concern; and (3) Alternative 5C - Establish expanded closures in the Aleutian Islands and Gulf of Alaska to minimize the effects of fishing on EFH. Specific actions are (HAPC/EFH Motion of 10 February: http://www.fakr.noaa.gov/npfmc/current_issues/HAPC/HAPCmotion205.pdf)

<u>Bering Sea:</u> *Initiate an expanded analysis for the Bering Sea, as well as an assessment of gear modifications that tiers off of this EFH EIS analysis to further explore possible mitigation measures in the Bering Sea. The analysis should include the existing alternative, an alternative to leave the rolling closure area open, and options to open the "red hatched" closed area south of Nunivak Island and north of the Bogoslof area, with other alternatives to be developed.*
<u>Aleutian Islands</u>: *Allow bottom trawling to continue in AI areas that have supported the highest catches in the past, and prohibits bottom trawling in all other portions of the AI management region to prevent future impacts to undisturbed habitats in those areas as*

described in a modified Option 3, as described in the attached Figure (modified ES-12) and including six Aleutian Islands Coral Gardens (as identified in Figure ES-11). The six coral gardens are closed to all bottom contact gear. Pelagic trawls could be used outside of the designated open areas, but only in an off-bottom mode. The existing observer program will be utilized, and a vessel monitoring system (VMS) for all fishing vessels is required. A comprehensive plan for research and monitoring will be developed. Option 3 opens designated areas based on areas of higher effort distribution from 1990 through 2001 as modified through input from trawl fisherman and public testimony.

EFH preferred alternatives (from EFH EIS) include an area within the Aleutian Islands that would allow areas shown in green to remain open to bottom trawling (12,423 nm2), all other areas in the Aleutian Islands EEZ would be closed (279,114 nm2). Additional areas in red are to be closed to all bottom contact gear to protect six coral and sponge gardens (110 nm2).

The most effective implicit management reference point is the OY of 2 million t from the BSAI, initially determined as the average surplus production for the BSAI. This effectively limits individual species TACs because the sum of the recommended ABCs across all managed species is typically greater than the OY. This puts an "ecosystem management" limit on to what are essentially single species calculations of sustainable yield.

Clearly the management system is capable of acting to detect and minimize ecosystem impacts of the fishery, and to create systems which protect key species, and reference points take implicit account of ecosystem effects, meeting the 80 guideline. However, there has been little testing in the case of the Pacific cod longline fishery, and the reference points are not determined explicitly nor quantitatively, so not meeting the 100 guideline.

Subcriterion 2.1.5

Assessments of impacts associated with the fishery including the significance and risk of each impact show no unacceptable impacts on the ecosystem structure and/or function, on habitats or on the populations of associated species.

Indicator 2.1.5.1 All the significant effects of the fishery on the ecosystem have been identified.

100 Scoring Guidepost

- The effects of the fishery on the ecosystem have been identified by appropriate comparative and/or experimental studies.
- There is a monitoring program capable of identifying any fishery-induced changes to community structure and population dynamics.

80 Scoring Guidepost

- There is a comprehensive evaluation of the effects of the fishery on the ecosystem based on existing information.
- A monitoring program is being developed.

60 Scoring Guidepost

- Main impacts of the fishery on the ecosystem are known from existing information.
- Ongoing monitoring is weak.

Score 80

The EFH EIS, the PSEIS and the ECOSIM/PATH models have all been explained earlier, and evaluate various impacts of the fishery on the ecosystem. The longline fishery's impact on benthic habitat is assumed to be low, though additional experimental evidence is required to confirm the assumptions of the LEI analysis, and the ECOSIM results suggest that the ecosystem is relatively insensitive to removal of Pacific cod biomass. There is a monitoring program (Boldt et al. 2004) which regularly looks at all aspects of the ecosystem and examines fishery interactions.

The current level of knowledge about direct impacts is given in Table 4.

Table 4. Main species impacted by the Pacific cod longline fishery in the BSAI.

Species/group	Population status	Annual take	Risk assessment	Source
Anthozoa (gorgonians, sea whips, hard corals)	Unknown	100 – 200 t, 60% of total groundfish catch	Unknown	Some discussion in SAFE ecosystem chapter
Skates	No evidence of overfishing	About 14,000 t out of total 20,000 t BSAI	Catches are 4% of available biomass and < ABC of 35,80 Scoring	SAFE assessment of other species

			Guidepos t t	
Sleeper sharks	No evidence of overfishing , not threatened	About 20 t out of total of 350 t.	Catches currently low in relation to populatio n size, 1% of biomass.	SAFE shark assessme nt
Grenadiers	No evidence of overfishing	About 600 t, 10% of BSAI total (most is taken in the sablefish fishery)	Unlikely to be endanger ed given species caught	PSEIS, SAFE ecosyste m chapter
Sculpin	No evidence of overfishing	About 1,500 t out of total 7,000 t.	Catches are 4% of survey biomass and < ABC of 29,000 t.	SAFE assessme nt of other species
Northern Fulmar	2.1 million birds,	About 7,000	Catches are less	SAFE ecosyste

	USFWS in 1998.	birds (average 1993-2003, reducing recently to about 3000 annually	than 1% of population	m chapter
Laysan Albatross	874,000 birds (Birdlife international)	About 500 birds annually	Catches are 0.06% of population	SAFE ecosystem chapter
Northern Fur Seal	Depleted and declining	None		
Steller sea lion	Threatened	None		
Short-tailed albatross	Endangered	Usually 0, but 4 estimated taken in 1996 and 8 in 1998	Albatross population still growing	

Fish

As noted in Table 4, there are significant catches of several non-target fish species. Although assessments are limited, and may not be focused at species level, available information suggests that the catches are sustainable.

The most serious problem with respect to fish is the unknown effects of fishing on the skate species complex. The longline fishery catches the bulk of the skates, which are a species complex occupying different habitats and regions within the BSAI (Table 5). The species within this complex occupy different habitats and regions within the BSAI FMP area. The EBS shelf skate complex is dominated by a single species, the Alaska skate (*Bathyraja parmifera).* The Bering or sandpaper skate *(B. interrupta*) is next most common, being distributed on the outer continental shelf. While skate biomass decreases somewhat on the EBS slope, skate diversity increases substantially. The skate community in the AI appears to be different from that described for both the EBS shelf and slope. In the AI, the most abundant species is the whiteblotched skate, *B. maculata*.

Table 5. Skate species complex in the BSAI. From Gaichas et al, 2004.

Table 16-11. Species composition of skate complex from most recent AFSC BSAI trawl surveys.

		2004 EBS shelf		2004 EBS slope		2004 Aleutians	
Skate species	common	bio (t)	cv	bio (t)	cv	bio (t)	cv
Bathyraja abyssicola	deepsea	0		164	0.72	0	
Bathyraja aleutica	Aleutian	2,463	0.41	15,039	0.14	11,518	0.45
Bathyraja interrupta	Bering	11,709	0.12	1,957	0.11	147	0.75
Bathyraja lindbergi	commander	0		4,167	0.15	0	
Bathyraja maculata	whiteblotched	0		3,433	0.16	26,246	0.25
Bathyraja minispinosa	whitebrow	0		1,771	0.22	34	1.00
Bathyraja parmifera	Alaska	413,061	0.05	4,248	0.33	12,742	0.22
Bathyraja taranetzi	mud	0		698	0.20	1,799	0.17
Bathyraja trachura	black	0		1,677	0.13	1	0.98
Bathyraja violacea	Okhotsk	0		8	0.99	0	
Raja binoculata	big	479	1.00	0		422	0.53
Raja rhina	longnose	0		0		0	
skate unid (all others)		1	1.32	20	0.52	142	0.38
Total skate complex		427,713	0.05	33,182	0.08	53,050	0.16

At present, the available data do not support population modeling for skates in the BSAI. Skates are considered in their entire species complex as Tier 5 species, with ABC = 0.75MB where B is the sum of the EB shelf, EB slope and AI biomass from surveys. ABC is calculated currently as 35,800 t (M=0.1). The OFL is calculated to be 47,800 t.

No information is available to enable a calculation of natural mortality for any skate stocks in the BSAI FMP area, so M is estimated using the methods as applied to data for California Big skate (*Raja binoculata*) and Longnose skate (*R. rhina*), which are found in the GOA but are rare in the BSAI. The most conservative of a number of estimates is currently used (Gaichas et al 2004).

This is a conservative approach to the problem of lack of information and the inability to undertake a species-based analytical assessment. Table 2 suggests that current catches are lower than the ABC. However, the complex includes some species which are large and may be long-lived and more vulnerable than others (e.g., *R. binoculata*, *B. violacea*). There is currently the interest in NMFS for developing better assessments of these species, and a number of research programs are under way (Gaichas et al 2004).

The Pacific cod longline fishery only accounts for about 10% of the total grenadier catch in the BSAI, the rest being taken by longline fisheries for sablefish and turbot. The most vulnerable species, Pacific grenadier, inhabits a depth zone (600 – 2500m) which is generally beyond the normal fishing depth of cod longliners (PSEIS Tables 3.5-66 and 3.5-68). The most commonly taken species is the giant grenadier. The SAFE Ecosystem chapter (Boldt et al. 2004) has this to say about current catch levels. *Estimated annual catches of giant grenadier in Alaska may have ranged between 13,000 mt and 21,000 mt in the years 1997-2001. The large biomass of giant grenadier in Alaska may be able to support this level of catch, but the reported longevity and slow growth of this species makes it susceptible to overfishing. Furthermore, a high proportion of the catch is likely female because mostly female giant grenadier live at the depths where the commercial fishery operates. Disproportionate removal of females by the fishery could put stocks of giant grenadier at greater risk. One possible mitigating factor that may protect giant grenadier from overfishing is that a substantial portion of its population may inhabit depths >1,000 m, where they are safe from any fishing pressure. These deep waters would act as a de facto reserve to replenish giant grenadier removed by the fishery in shallower water.*

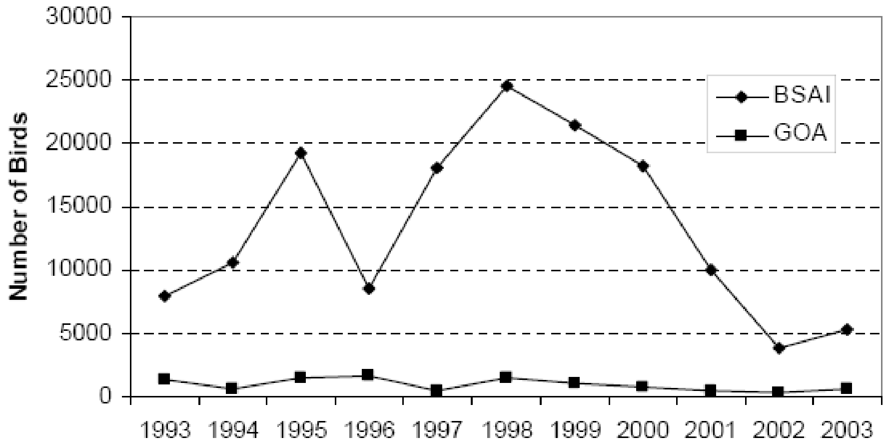
Like skates & rays, catches of sleeper sharks is of concern. However, the level of impact is assessed as being very low, and mostly due to trawl fisheries rather than the longline fishery (Table 4). Courtney et al (2004) reviewed shark catches and stock indices and concluded that there is no evidence to suggest that overfishing is occurring for any shark species in the GOA or BSAI.

Birds

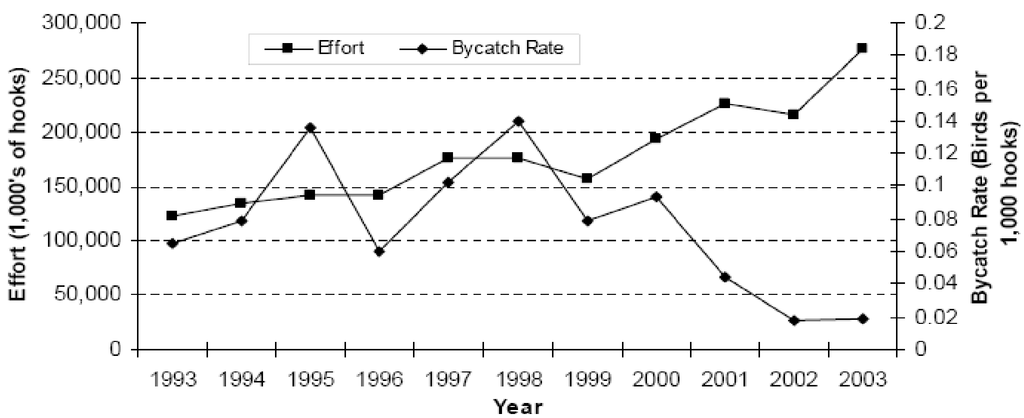
As noted in the table above, large numbers of birds are caught in the Pacific cod longline fishery. Seabird catches have declined recently due to the introduction of paired streamer lines as mitigation measures on board all vessels. This development followed research by Alaska Sea Grant and a report (Melvin et al, 2000). All seabird bycatches are thought to be within sustainable limits. With new mitigation measures, paired streamer lines, the total bird catch has reduced to 5000 birds annually (Contributions by Fitzgerald et al to the SAFE ecosystem chapter, Boldt et al. 2004: see Figure 15). The species composition for seabird bycatch in the BSAI longline fishery is 59% fulmars, 20% gull species, 12% unidentified seabirds, 4% albatross species, 3% shearwater species, and 2% 'all other' species.

Figure 15. Reduction in seabird bycatch resulting from the implementation of mitigation measures for seabirds, from Fitzgerald et al (2004). a) number of birds caught in longline fisheries b) catch rates and effort c) estimates of fulmar catch by gear with low estimates of trawl catch and estimates of fulmar catch by gear with high estimates of trawl catch.

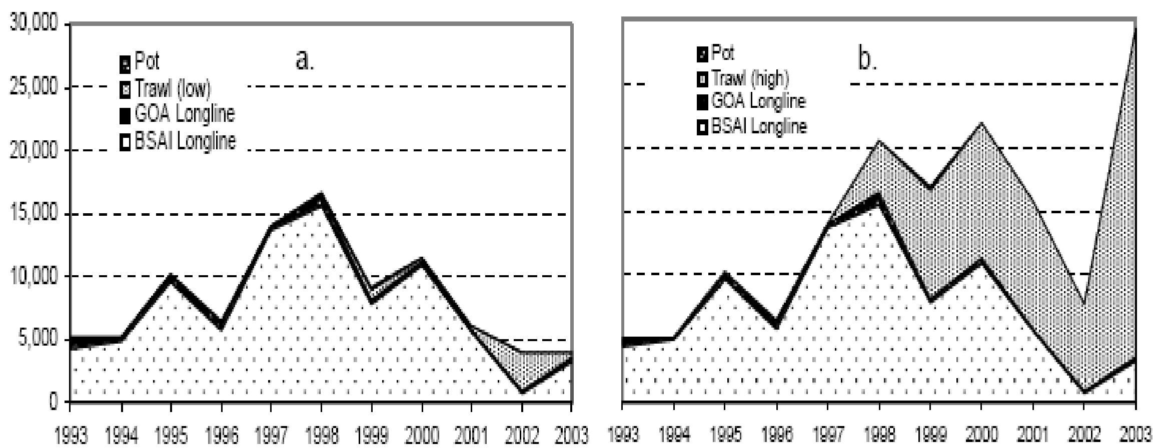
A.


30000
25000
20000
15000
10000
5000
0
Number of Birds
BSAI
GOA
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

B.


300,000
250,000
200,000
150,000
100,000
50,000
0
Effort (1,000's of hooks)
Effort
Bycatch Rate
0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Bycatch Rate (Birds per 1,000 hooks)
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003
Year

C.


30,000
25,000
20,000
15,000
10,000
5,000
0
a.
Pot
Trawl (low)
GOA Longline
BSAI Longline
b.
Pot
Trawl (high)
GOA Longline
BSAI Longline
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

Mammals

Direct interactions of mammals with the longline fishery are very rare. Steller sea lions occasionally become entangled. However, there are concerns that removal of prey in areas of close proximity to both Steller sea lion and northern fur seal colonies may have adverse impacts. Pacific cod is an important food for Steller sea lion around Unimak Island, particularly in the winter, although even then it is not the major component of their diet, and there has been some concern that fishery induced local depletions of Pacific cod may be compromising sea lion recovery. To test this NMFS conducted an experiment in Cod Alley in 2003 and 2004 to investigate the local depletions of cod by fishing within and adjacent to Steller sea lion no trawl areas (Cotter, pers comm.; presentation to the SCS Assessment Team). Pot fishing before, during and after major trawling effort failed to detect local depletions, or differences between fished and non-fished areas in cod density, and it was concluded that cod are too mobile to be affected by local fishing events. Tagging studies confirmed that the retention time for Pacific cod in small local areas in cod alley is very short (on the order of a few days). By contrast, local depletions of territorial Atka mackerel were seen. Additional research to investigate the cause of Steller sea lion declines is summarized by Ferraro and Fritz (2002, cited in Tagart 2005). It should also be noted that the food competition hypothesis to explain declines in Steller sea lion abundance while not dismissed, has been judged less likely to be the proximate cause of their decline (NAS, 2003, cited in Tagart et al 2005). The NAS report places greater emphasis on evaluation of a "top down control", i.e., predation, most likely by killer whales. NAS says, "*The population models suggest that increased adult mortality more readily accounts for the rapid decline in the 1980 than either reduced fertility or increased juvenile mortality due to food limitation. Therefore, the question shifts away from "Is it food?" to "Were they food?"*.

Although Northern fur seals are declining Pacific cod is not a major part of their diet. Pacific cod ranks 7 in the diet of Steller sea lions, 8 in the diet of Harbor porpoises, and lower than 10 in the diet of Northern fur seals (PSEIS, Table 3.5-65.). Furthermore the longline fishery is not concentrated in Northern fur seal habitat or critical areas.

There is the potential for physical interaction between the longline fleet and North Pacific right whales. The fleet are aware of this problem (see particularly Marine Conservation Alliance, 2005), and to our knowledge there is no major conflict that would require notification under section 2.2 or action from the fishery.

The above summary provides ample evidence that fishery effects on the ecosystem are routinely monitored and that management takes these impacts into consideration when crafting their FMPs. While there may not be a comprehensive set of a priori rules to impose quantitative constraints on the directed fishery as a consequence of each and every identified ecological concern, the reaction of the management system is typically to move, slow or limit the scope of the fishery to accommodate these concerns. The major area where more work is needed is in the impacts of the fishery on skate populations and diversity.

Indicator 2.1.5.2 The impacts on ecosystem structure and function from removal of target stocks are known.

100 Scoring Guidepost

- The ecological consequences of current levels of removal of target stocks has been quantified to a sufficient extent that reasonable predictions can be made about the effect of target removals on ecosystem structure and function.
- This knowledge shows that current removals are within acceptable limits.

80 Scoring Guidepost

- Qualitative information is available on consequences of current levels of removal of target species.
- This suggests that there are no unacceptable impacts of the fishery on ecological systems within major fishing areas.

60 Scoring Guidepost

- The removal of target stocks is believed not to have unacceptable impacts on ecological systems.
- A program is in development to reduce these to acceptable, defined limits.

Score 90

Ecosim modeling, as reported above, has suggested that target species removals are within acceptable limits for the ecosystem. The PSEIS, EFH EIS and SAFE Pacific cod assessment (ecosystem impacts section), SAFE ecosystem chapter, do not identify the longline Pacific cod fishery as being a serious threat to the ecosystem through removal of the target species, although cumulative impacts from all groundfish fisheries are regarded as conditionally significantly adverse in the PSEIS (Table 4.5-100, 4.5-101). Current removals of target species are within acceptable limits.

Indicator 2.1.5.3 The impacts on ecosystem structure and function from removal of non-target stocks are known.

100 Scoring Guidepost

- The ecological consequences of current levels of removal of non-target stocks has been quantified to a sufficient extent that reasonable predictions can be made about the effect of removals on ecosystem structure and function.
- This knowledge shows that current removals are within acceptable limits.

80 Scoring Guidepost

- Some quantitative information is available on consequences of current levels of removal of non-target species.
- The available data suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas.

60 Scoring Guidepost

Qualitative information is available on consequences associated with removals of non-target species.

Score 85

Single-species limits: The main non-target species caught are anthozoans (and, presumably, hydroids), skates, grenadiers, sleeper sharks and Northern fulmar. As far as can be determined, as reported above, removals of these species are within acceptable limits although species-level assessments have not been carried out for all affected species and assessments are lacking for some groups (e.g., cnidarians and grenadiers).

Small catches of one sensitive rockfish species are taken. In 2003/2004, dusky rockfish catches in the BSAI were 154 t and 173 t respectively, of which the Pacific cod longline catch was 7t. These are assessed to be within acceptable limits (Reuter & Spencer, SAFE BSAI rockfish assessment).

Ecosystem limits: Although the catches of non-target species are thought to be within acceptable limits, these are single-species acceptable limits. We have not seen an assessment of the impact of these levels of non-target species catches on other ecosystem components, although the current formulation of the Ecosim model should be capable of delivering this level of information. However, since none of the so-far identified potential direct effects of the fishery on non-target species appears to be significant, it is quite unlikely that the secondary ecosystem effects of their removals would be significant. Thus the fishery easily passes the 80 Scoring Guidepost score.

The fishery clearly meets the 80 Scoring Guidepost. Of all the species identified in Table 2, the Pacific cod longline fishery creates the majority of impacts only for skates and fulmars. The catches of these species are reasonably well monitored, and the PSEIS has identified that ecosystem effects of their removals are probably minor. NMFS continues to regard the potential effect of skate bycatch to be of sufficient concern to be pursuing species specific assessments (Gaichas et al 2004). However, the ecological consequences of their removal has not yet received sufficient attention for the fishery to score 100. In particular, we are concerned that although less than 1% of the fulmar population is caught each year, there is no fulmar population model from which to determine the level of risk that this poses to the fulmar population, or what other ecological consequences it might have.

Indicator 2.1.5.4 Fishery impacts on habitat structure are known.

100 Scoring Guidepost

Effects on habitat structure are documented and are within acceptable tested and justified limits.

80 Scoring Guidepost

- Impacts of the fishery on habitat structure within major fishing areas have been studied.
- There is no strong evidence of significant impacts.

60 Scoring Guidepost

Impacts of the fishery on habitat structure within major fishing areas are estimated, although the issue has not been directly studied.

Score 75

In the Bering Sea, the Pacific cod longline fishery is conducted mainly on low relief mud, sand and gravel bottom. In the Aleutian Islands, the fishery occurs mainly in the bottom of sedimented gullies. High relief rocky substrate and coral, although not prime Pacific cod habitat, is fished sometimes, but may also be avoided to prevent entanglement and gear loss. The fishing gear is considered passive since it lies on the seabed until retrieved. However, the gear can move laterally both during setting and retrieval, and high tidal currents may cause substantial lateral movements. The lateral movement can dislodge sessile organism and disturb bottom habitat features (Rose, 2002). Hooks may also snag erect benthos such as gorgonians and coralline hydroids. Thus the hard substratum in the AI has a high sensitivity to longline impact (Table 6).

Table 6 Sensitivity matrix used for the calculation, in the EFH EIS, of the Long term effects index (LEI). The long term effects index is essentially a spatially disaggregated multiple of the intensity of fishing [(f) - proportion of each block’s area swept by the gear used by each fishery in an average year], the sensitivity of the substratum [(q) - proportion by which each feature’s function in each habitat is reduced by one pass of the gear used in each fishery], and the recovery rate of the habitat feature [(□) - recovery rate for the function of each habitat feature within each habitat]. The sensitivity of habitat to longlines is considered to be significant only for living structure, and to be more significant for hard substrates than soft substrates. Source: EFH EIS Table B.2-5

Table B.2-5. Estimates of the Q Parameter Used in the Analysis of Fishing Effects on Essential Fish Habitat

	Low Effect Estimate %	Central Estimate %	High Effect Estimate %	Quality Score	Comments
Bottom Trawls					
Infaunal prey	5	11	21	6	several related studies
Soft Substrates					
Epifaunal prey	4	10	17	6	several related studies
Living structure	1	15	21	5	some related studies
Non-living structure	0	2	5	4	value metric vague
Hard Substrates					
Epifaunal prey	16	18.5	22	5	some related studies
Living structure	10	20	30	5	some related studies
Non-living structure	1	2	5	4	value metric vague
Hard corals	22	27	35	4	few related studies
Pelagic Trawls (when contacting seafloor)					
Soft Substrates					
Infaunal prey	4	21	36	4	two related studies
Epifaunal prey	4	16.5	25.5	2	indirect rationale
Living structure	10	20	30	2	indirect rationale
Non-living structure	10	20	30	2	indirect rationale
Hard Substrates	0, not used on hard substrates (effort rescaled to reflect all efforts on soft portion)				
Longlines					
Infaunal prey		0.05		3	rationale for low effect
Soft Substrates					
Epifaunal prey		0.05		3	rationale for low effect
Living structure		5		1	very indirect rationale
Non-living structure		0.05		3	rationale for low effect
Hard Substrates					
Epifaunal prey		0.05		3	rationale for low effect
Living structure		10		1	very indirect rationale
Non-living structure		0.05		2	indirect rationale
Hard coral		0.05		1	very indirect rationale

Although the sensitivity of hard benthos is not as high for longlines as it is for trawls, it is much more likely that trawls try to avoid the areas of hard substratum altogether in the AI, remaining in the relatively restricted muddy gully areas, whereas longlines are able to fish the more difficult grounds. However, the amount and location of longline gear set in the fishery each year is documented by the required logbook program and the federal onboard observer program, and reveals that only approximately 4% of fishing days, 3% of hooks and 3% of catch is taken from the Aleutian Islands (Tagart et al 2005; Thompson & Dorn 2004). Thus the overall LEI for the Pacific cod fishery in the AI was relatively low (Table 7).

Table 7. Effort and catch details, Pacific cod longline fishery, 2004

	AI	EBS	BSAI
days fishing	197	4,716	4,913
hooks set	6,319,868	200,945,122	207,264,990
catch (t) Pacific cod	2483	74681	77164

Various sources (see discussion under 2.1.3.1 above) cite the impact of longlines on benthos to be minor. However, there is little empirical information available on the impact of lost bottom longline gear on the seabed habitat. The fishery scores relatively low on this indicator because of the lack of scientific studies on the effects of the gear on the BSAI habitat mean that it does not actually reach the 80 Scoring Guidepost. Although most experts believe the impacts of the bottom longline gear on habitat are low, and the proportion of the fishery that takes place in the AI, where the impact is likely to be highest is very small, the necessary studies to prove such assumptions have not been conducted in the BSAI.

Condition

Same 2.1.3.2

Indicator 2.1.5.5 The effects of the fishery on associated biological diversity and productivity are documented.

100 Scoring Guidepost

The effects of the fishery on biological diversity and productivity have been quantified and are within acceptable tested/justified limits.

80 Scoring Guidepost

Impacts of the fishery on biological diversity and productivity have been studied and are within estimated limits.

60 Scoring Guidepost

Impacts of the fishery on biological diversity and productivity are estimated, although the issues have not been directly studied.

Score 80

The PSEIS and the EFH EIS are extremely comprehensive documents. They integrate and summarize research over the past 50 years and review management practices over the last 30 years. The preferred alternative for the PSEIS is a selection of policies from the suite of alternatives evaluated and represents a slightly more precautionary approach than that previously in place. The preferred alternatives from the EFH EIS review are based around site-specific approaches to identifying habitat areas of particular concern and establishing expanded closures. There are research programs under way by the AFSC to investigate the relationship between the Pacific cod fishery (trawl and longline) with the main mammal of concern, Steller sea lion, and active development of assessments of impact of the fishery on non-target species. In the BSAI system as a whole, there is active recovery of some species of previously depleted rockfish (SAFE other rockfish assessment). The Ecopath model takes diversity and productivity into account, and there are a suite of monitored indicators of the ecosystem (SAFE ecosystem chapter), including ecosystem productivity. The following are monitored: Bering Sea trophic level of catch, Aleutian Islands trophic level of catch, Togiak age-4 herring recruits, COMU (Common murre) productivity (fledglings per egg), BS diversity, BS richness, BLKI (Black-legged kittiwake) productivity (fledglings per egg) at St. Paul Island, TBM (Thick-billed murres) productivity (fledglings per egg) at St. Paul Island, RLKI (Red-legged kittiwake) productivity (fledglings per egg) at St. Paul Island. The OY of 2 million t is an additional precautionary approach to BSAI fisheries management.

The PSEIS states that, "*Impacts on energy removals are determined to be insignificant with respect to the potential for producing changes in system biomass, respiration, production, or energy cycling outside the range of natural variability*." Furthermore, in the context of re-directed energy discards are "*determined to have an insignificant potential effect on ecosystem-level energy cycling characteristics.*" Regarding diversity, the analysis suggests a possibility of some alteration in genetic diversity as a consequence of fishing; no impact on functional diversity with respect to trophic dynamics, but some impact on functional diversity of structural habitat (Tagart et al 2005).

The addition of an index of skate diversity would be appropriate.

Measurement is very comprehensive, probably more comprehensive than for any other world marine fisheries region. Many of the fisheries impacts (e.g. on bycatch) are within acceptable limits. A general ecosystem biodiversity/productivity related fishery limit, in addition to being elusive scientifically, may not be useful or appropriate in a management sense. The most obvious problem with the current state of knowledge is the lack of analytical population models for the two most heavily impacted species, skates and fulmars. This lack reduces the score because, whilst the present assessment (Gaichas et al 2004; Boldt et al., 2004; see Table 2) suggests that there are no impacts on the diversity and productivity of these species and their dependent ecosystems, this is not yet clearly, analytically shown.

Recommendation:

Develop analytical models for skate populations. Develop indices of skate diversity and track to monitor, especially, high vulnerability species. Develop mitigation methods for skates (gear/bait issues).

2.2 (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.

Subcriterion 2.2.1
Fishing is conducted in a manner that does not have unacceptable impacts on recognized protected, endangered or threatened species.

Indicator 2.2.1.1 There is information on the presence and populations of protected, threatened and endangered species.

100 Scoring Guidepost

- There is knowledge of all populations of protected, threatened, and endangered species directly or indirectly related to the fishery including an assessment of temporal variability.
- The type and distribution of critical habitats have been identified.

80 Scoring Guidepost

Key protected, threatened and endangered species directly related to the fishery have been identified and their distribution within the fishery known.

60 Scoring Guidepost

There is a program in place to identify protected, threatened and endangered species directly related to the fishery.

Score 90

The Pacific cod longline fishery has the potential to interact with three threatened or endangered species: the short-tailed albatross (*Phoebastria albatrus)*, the Steller's eider (*Polysticta stelleri*) and the Steller sea lion (*Eumetopias jubatus*) (Tagart et al 2005).

The threatened Steller's eider is predominately a near-shore bird that feeds on amphipods, polychaete worms, clams and snails. Listed in 1997, the population size is not well known. Russian nesting birds are thought to number 100 to 150 thousand birds; nesting populations in Alaska have declined substantially since the 1920s. The geographic distribution and trophic feeding patterns make it very unlikely that this species will interact with the Pacific cod longline fishery.

The Pacific cod longline fishery interacts with the endangered short-tailed albatross. The short-tailed albatross ranges throughout the North Pacific Ocean and north into the Bering Sea during the nonbreeding season. This species was listed as endangered in 1976. Hunted to near extinction in the early 1900s, presently these birds nest only on two islands in Japan, Torishima and Minami-kojima. Based on data from site visits to the two known breeding colonies in 2001 and estimates of the fraction of adult and sub-adult birds that do not visit the breeding colonies, the world population of short-tailed albatross was estimated at 1,600 to 1,700 individuals. The population is said to be growing at the maximum rate possible. The total population in 2004 is estimated at about 1,900.

Steller sea lions were listed as threatened in 1990, and the "western population" (west of 144° W longitude) was listed as endangered in 1997. The Pacific cod fishery interacts with Steller sea lions predominately through competition for prey. Pacific cod are a significant component of the Steller sea lion diet, particularly during winter and early spring. Designated aquatic critical habitat for the eastern stock of the Steller sea lion consists of the areas within 3,000 ft (0.9 km) of designated rookeries and haulouts. The population of Steller sea lions is assessed via counts at known haulouts and rookeries. From 2000 to present, using counts derived from comparable methodologies, the western population of Steller sea lions has increased by 12 percent (Tagart et al 2005).

The northern fur seal ranges throughout the North Pacific Ocean from southern California north to the Bering Sea and west to the Okhotsk Sea and Honshu Island, Japan (SAFE ecosystem chapter). Breeding is restricted to only a few sites (i.e., the Commander and Pribilof Islands, Bogoslof Island, and the Channel Islands). Northern fur seals were listed as depleted under the MMPA in 1988 because population levels had declined to less than 50% of levels observed in the late 1950s, with no compelling evidence that carrying capacity had changed, and will remain defined as depleted" until the population reaches 60% of its carrying capacity (Tagart et al 2005). Pribilof Islands populations have been declining since the late 1970s. The decline in pup production continued in 2004 (Fritz, pers comm.: presentation to MSC assessment). Fisheries regulations were implemented in 1994 (50 CFR 679.22(a) (6)) to create a Pribilof Islands Area Habitat Conservation Zone, in part, to protect the northern fur seals. There is little evidence, however, that the Pacific cod longline fishery has any negative impact on fur seals.

We do not consider the NMFS-defined "prohibited species" halibut and salmon to be relevant to section 2.2.1. However, these species are subject to full assessments, the setting of catch limits, and detailed monitoring by the fleet and by observers. The assessments, catch limits, and monitoring assure that fishing does not threaten biodiversity for these species.

Indicator 2.2.1.2 The interactions of the fishery with protected, threatened and endangered species are known.

100 Scoring Guidepost

Reliable quantitative estimates are made of the interactions of all populations of protected, threatened, and endangered species directly related to the fishery, and qualitative information is available on indirect impacts.

80 Scoring Guidepost

Quantitative estimates are made of the effects of interactions directly related to the fishery on populations of protected, threatened and endangered species. No information is available on indirect impacts.

60 Scoring Guidepost

The main interactions directly related to the fishery are known, but the quantitative effect of these interactions on protected, threatened and endangered species is unknown.

Score 90

Because of separation of feeding areas and the fishery, interactions between the fishery and threatened Steller's eider is considered to be negligible (BO 2003, Figure 4).

There is potential for interaction between short-tailed albatross and the fishery, specifically for longline fishing. The following review of short tailed albatross protection is taken from USFWS (2003). In 1987 a short-tailed albatross was taken by a halibut fisherman near Middleton Island in the Gulf of Alaska. In 1989 a non-jeopardy Biological Opinion (BO) was issued to NMFS on the effects of the Interim Incidental Take Exemption Program for marine mammals, and related fishing activities, to all listed species under Service jurisdiction, including short-tailed albatross. The Service [does "Service" refer to USFWS or NMFS?] concluded that commercial fishing, and especially commercial longline and gillnet fishing, would adversely affect the short-tailed albatross through direct injury or mortality from entanglement with hooks, nets, and other gear. The Service also identified problems associated with entanglement or ingestion of plastics, and other debris, competition with the fishery for certain species utilized as food by albatrosses, and injury resulting from contact with petroleum products spilled or leaked from vessels. The anticipated incidental (annual allowable) take of short-tailed albatrosses was set at two birds per year. Reasonable and prudent measures and terms and conditions required, inter alia, that fishery observers become trained in identification of short-tailed albatrosses and report all sightings, and all observations or recoveries should be reported.

In 1995 two short-tailed albatross were taken in the IFQ sablefish fishery, and another in the observed sample (i.e. within the sample of hooks closely monitored by the observer) in the BSAI hook and line fishery in 1996. In 1997 NMFS was awaiting the results of experiments on the effectiveness of mitigation devices in the longline fishery and extended the incidental take measures to a maximum of 4 birds in 2 years. Two albatross were taken in 1998, both in the observed sample. The Washington Sea Grant study was initiated in 1999 and reported on the successful design of mitigation measures in 2001. Following this publication and its recommendations, the Council updated its regulations (which up to that point included making bait sink as fast as possible, not dumping offal whilst gear is being set or hauled and towing a streamer line, or a buoy, or setting through a tube, or deploying during darkness; these measures were adopted following experiences with longline-albatross interactions in the Antarctic reported by CCAMLR). The updated regulations require all vessels over 55 ft LOA to deploy paired streamer lines.

All vessels in the Pacific cod longline freezer fleet come into this category, and are therefore be obliged to use paired streamer lines.

The Biological Opinion of 2003 (USFWS 2003) found that the world-wide population of short-tailed albatross was 1730 birds, and through population modeling that catch levels of five times greater than have occurred in US longline fisheries could occur before a decline in the current 7-8% growth rate in the population would occur. The BO found that the current actions (management plans for groundfish fisheries in the BSAI) were unlikely to jeopardize the continued existence of the short-tailed albatross (either through direct or indirect interactions) or Steller's eider.

Although the BSAI freezer longline Pacific cod fishery has little direct impact on marine mammals, indirect impacts of the fishery through marine mammal prey reduction are possible. Full details of the history of the Steller sea lion debate, biological opinions and lawsuits is given in Chafee et al (2005). The final 2001 Biological Opinion (NMFS 2001), 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, which include a prohibition of all fishing within 3 nautical miles of rookery sites, and more extensive closures (up to 20 nautical miles) from selected haulout or rookery sites. This included no jeopardy for Steller sea lions from Pacific cod fisheries in the BSAI, although the evidence for interactions between the cod fishery and Steller sea lions is not as strong as for Pollock.

Populations of Steller sea lions are regularly surveyed, and there is an active program studying reproductive success, distribution, feeding, and physiology (e.g. Loughlin et al 2003, Fadely et al in review). Studies into the possible ecosystem effects on Steller sea lions of the Pacific cod fishery are continuing (see description of the experiments in section 2.1.5.1; SAFE ecosystem chapter; Thompson & Dorn 2004; Conners et al. 2004; Ecosim model of the BSAI see section 2.1.1.3). Although Pacific cod are not the primary prey of Steller sea lions, they are important in the winter, especially in the eastern AI around Unimak Island, when they can be in the top 4 prey items (even though the PSEIS ranked Pacific cod only 7th in importance for Steller sea lions over the whole of their BSAI range). It has been pointed out that the greatest decline in Steller sea lion populations occurred during the 1980 when Pacific cod stock was growing to very high levels, and as previously reported the food competition hypothesis to explain declines in Steller sea lion abundance while not dismissed, has been judged less likely to be the proximate cause of their decline (NAS, 2003). Furthermore, studies in the central gulf of Alaska suggest that it is female fecundity rather than adult or juvenile survivorship that has created the declines (Fritz, pers comm.). There appears to be a slight recovery of Steller sea lion populations in the eastern AI, in the area of Unimak Island and cod alley (Fritz pers comm.). Whether this is due to the restrictions of fishing, including for cod, around sea lion rookeries is not yet known, but the redistribution of fishing effort away from colonies is unlikely to be hindering recovery, especially if there are non-ecosystem mediated reasons for the drop in fecundity (e.g. disturbance).

Thus for both endangered and threatened species, regular monitoring and research is carried out. Whilst this is continuing, and whilst there is still no clear conclusion on the impact of Pacific cod fisheries on Steller sea lions, the fishery cannot be given 100.

Indicator 2.2.1.3 The level of interaction known to pose an unacceptable risk to protected, threatened, or endangered species is known.

100 Scoring Guidepost

- Critical interactions are well enough known to enable the quantitative determination of acceptable limits of interaction that do not endanger populations of protected, threatened and endangered species.

- Current levels of take of endangered and threatened species are sufficiently low that they can be expected to keep impact well below levels that harm threatened and endangered populations.

80 Scoring Guidepost

- Critical interactions are well known allowing reasonable estimation of the level of interaction that would pose an unacceptable risk to protected, threatened and endangered species.
- Available information suggests that current interactions are below the level at which protected, threatened and endangered species would be at risk.

60 Scoring Guidepost

Known effects are within acceptable limits of national and international legislative requirements and are believed to create no biological threats to the species concerned.

Score 90

Quantitative data are available to enable population models to be constructed and acceptable catch limits to be determined for short-tailed albatross. The allowable take of albatross (2 per year) is well below levels expected to harm the population. The fishery meets the 100 guideline with respect to short tailed albatross.

The fishery has very little direct interaction with Steller sea lions or Steller eiders, and the incidental catch is negligible to the point that acceptable catch limits are not considered to be necessary. As detailed in 2.2.1.2, there is considerable research still to be undertaken on the interaction between Steller sea lions and the cod fishery. It should be noted that unlike the trawl fishery most longline effort is well north of Steller foraging areas, in the EBS, very little fishing taking place around Unimak Island, and none in January to March during the cod spawning season. However, the actions taken to date, including the Steller sea lion Critical Habitat Areas are precautionary and are unlikely to further aggravate any indirect interaction between the fishery and these endangered species. Thus in respect of Steller sea lions the fishery falls somewhat short of the 100 guideline though scores above 80.

Subcriterion 2.2.2
Strategies have been developed within the fisheries management system that address and restrain impacts of the fishery on threatened and endangered species and on components of the ecosystem critical to these species to insignificant levels.

Indicator 2.2.2.1 Management objectives are set in terms of impact identification and avoidance/reduction.

100 Scoring Guidepost

- Tested management objectives are set to detect and reduce impacts, maintaining them well below the levels determined as acceptable catch limits.
- Management is also designed to adequately protect ecosystems, habitats and populations of threatened and endangered species.

80 Scoring Guidepost

- Management objectives are set to detect and reduce impacts to threatened and endangered species.
- These are designed to maintain catch levels to within quantitatively determined acceptable limits.

60 Scoring Guidepost

- Limited management systems exist in terms of impact identification and avoidance/reduction.
- Actions are mainly reactive rather than proactive.

Score 85

Direct impacts of the fishery on protected, threatened and endangered species are measured with reliable accuracy by the federal onboard observer program (see 2.2.1.1). Federal observer reports of takes of protected, threatened and endangered species are submitted daily to NOAA Fisheries and the Protected Resources Division (Tagart et al 2005). If the level of take in the fishery approaches or meets the allowed incidental take level, an immediate reconsultation process is triggered. Depending upon the outcome of the reconsultation, NOAA Fisheries can take actions to reduce impacts such as closing the fishery in particular areas or completely halting the fishery for the year. Management policies and procedures are in place to expedite decisions and comply with rule-making regulations to reduce or eliminate the interactions of the fishery with the protected species. New closed areas (resulting from the recommendations of the EFH EIS) aim to protect habitats in the AI and there are other closed areas designed to avoid conflicts with Steller sea lions, through maintenance of habitats and ecosystems close to rookeries and haul-outs, and Northern fur seals, although the latter are not yet threatened.

Numerous Steller sea lion conservation measures have been implemented in the Pacific cod fishery; some are described below, but for a full description see the supplement to the 2001 BiOp (NMFS 2003). Directed fishing for Pacific cod would be prohibited if Steller sea lion biomass fell below B20% (NMFS 2003). The Pacific cod TAC is also allocated by both gear type and season in the BSAI and GOA, although there are regulatory differences between these two areas. There are also area restrictions for the different gear types (NMFS 2003). In addition, there are five haulouts in the Bering Sea for which no fishing is permitted within the 0 – 20 nm zone (NMFS 2003). In the Bering Sea, there is also no trawling permitted within 0 –10 nm of all rookeries and haulouts, and no fishing with any gear type permitted within 0 – 3 nm of all rookeries and haulouts (with the exception of jig gear, which is permitted in the 0 – 3 nm closures around haulouts) (NMFS 2003).

The 80 scoring guidepost is therefore easily met. However, in-season measurements of indirect impacts of the fishery on protected species are not currently possible and few of these management objectives have been explicitly tested. They are precautionary rather than tested, and therefore score higher than 80 Scoring Guidepost but lower than 100.

2.3 (MSC Criterion 3)
Where exploited populations (of non-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 potential yields.

Subcriterion 2.3.1
There are management measures in place that allow for the rebuilding of affected populations.

Indicator 2.3.1.1 There is sufficient information to allow determination of necessary changes in fishery management to allow recovery of depleted populations.

100 Scoring Guidepost

- There is a clear understanding of functional relationships between the impacted population and the fishery.
- Intervention measures based on this understanding have been tested, and shown to be effective in promoting recovery and rebuilding of depleted species.

80 Scoring Guidepost

There is adequate information, combined with a precautionary approach wherever necessary, to allow alterations to be made to fishing in a way that may reasonably be expected to recover and rebuild depleted species.

60 Scoring Guidepost

There is some information on functional relationships, sufficient to allow alterations to be made to fishing in a way that may reasonably be expected to recover and rebuild depleted species.

Score 85

With respect to endangered or threatened species, there is a good understanding of the functional relationships between the fishery and short tailed albatross and intervention measures have been shown to be effective in keeping impacts below levels which would harm recovery of the stock (100 guidepost). With respect to Steller sea lions there is not a good understanding of the functional relationships, but the actions taken are precautionary and should be expected to enable the populations to recover (80 Scoring Guidepost). The Pacific cod fishery does not appear to jeopardize the Steller sea lion population but precautionary measures are expected to mitigate any impacts from the fishery.

The Magnuson-Stevens Act which governs management of BSAI groundfish contains explicit language dealing with the determination of overfishing and the management consequences of overfishing (Tagart et al 2005). Overfishing is defined as any amount of fishing in excess of the maximum fishing mortality threshold (MFMT). Stocks whose biomass is less than 1/2 BMSY are regarded as below their minimum stock size threshold (MSST) and are overfished. The Magnuson-Stevens Act requires Councils to take explicit steps to prevent overfishing. In cases where a stock or stock complex is overfished, Council action must specify a time period for rebuilding the stock or stock complex that satisfies the requirements of section 304(e)(4)(A) of the Magnuson-Stevens Act. The NPFMC adopted harvest control rules have a built in reduction in allowable levels of fishing mortality when stocks decline below target biomass. This device is intended to prevent stocks from approaching an overfished condition.

Gulf of Alaska Pacific ocean perch were overfished by foreign fishermen in the mid to late 1960s. Because Pacific Ocean perch is the only Alaskan groundfish stock that has experienced “overfishing”, NPFMC/NMFS has little empirical evidence for the capacity of overfished stocks to recover to MSY.

Indicator 2.3.1.2 Management measures are in place to modify fishery practices in light of the identification of unacceptable impacts.

100 Scoring Guidepost

- Monitoring programs are implemented in a proactive manner within the management system to allow modification of fishery practices in light of the identification of unacceptable impacts.
- Objectives and limits for environmental change are used to guide operational practices.

80 Scoring Guidepost

- Effective management measures are in place to modify fishery practices in light of the identification of unacceptable impacts.
- The fishery responds rapidly and effectively to implement management measures.

60 Scoring Guidepost

A mechanism exists for the modification of fishing practices in light of the identification of unacceptable impacts.

Score 80

The Council process is deliberative. Changes in management practices seldom happen quickly. Federal law does provide for faster emergency actions which can be imposed for a limited time period (90 days renewable to 180 days). However, Councils must show the true emergency required and are not authorized to circumvent normal decision making processes if the regulatory change desired was foreseeable. This constraint assures the opportunity for full and complete hearings on the rationale for the proposed regulatory change, the action being proposed, and the impacts on the fishery and resources as a result of these actions.

Views on the rapidity with which the Council has acted in the past are mixed. The fishery has demonstrated early precautionary action. For instance, Steller sea lions were listed as threatened in 1990, and by 1992 closed areas were in place (Thompson, pers comm.) and regularly reviewed throughout the 1990s. However, it took two judicial reviews to stimulate the PSEIS. The first was in 1991 and upheld NMFS Section 7 consultation which found no jeopardy for Steller sea lions with current groundfish (principally Pollock) management plans. The second was in 1999, and overturned the NMFS findings, triggering the PSEIS, a fresh consultation and biological opinion. 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 responses to catches of short tailed albatross were swift, and the Council acted on the recommendations of the Melvin et al (2001) report similarly swiftly. But knowledge of skate and ray species has been slow in coming, despite awareness of the problem in the late 1990s stimulating a review of observer sampling practices, which have now resulted in modification of sampling protocols to enable better biological information to be gathered on bycatch species (M. Loefflad, pers comm. – information to the MSC review team, June 2005).

The BSAI freezer longline Pacific cod fishery has itself demonstrated a willingness to tackle environmental problems and find solutions. Following the takes of short tailed albatross in 1995 and 1996, and understanding that potentially a take of 3 albatross could close the fishery, the North Pacific Longline Association took a pro-active approach to the problem (S. Fitzgerald, pers comm.: presentation to MSC assessment team, June 2005). It voluntarily implemented a set of non-regulatory measures, including report cards, a peer system and fleet education, and co-sponsored the Washington Sea Grant study on mitigation measures. Since 2001 a peer group has been in operation (comprised of a subset of freezer longline vessels), in which a private organization, Fisheries Information Services, accesses vessel in-season data and provides weekly reports to the group on catches of birds. Vessels with higher bird catches are contacted by peers and owners to discuss what occurred and explore measures to reduce bycatch. For peer-group members this has resulted in an 80% reduction in bird catches since 1998. The estimated bycatch of albatross in the BSAI reduced from 429 in 2001 to 48 in 2002.

Similar methods could be used to promote the development of mitigation methods for skate bycatch (see comments under 2.1.5.1).

Indicator 2.3.1.3	There is sufficient data and understanding of functional relationships to determine appropriate management measures which will allow recovery of depleted non-target populations.

100 Scoring Guidepost

- Appropriate rebuilding measures are based on a sound understanding of functional relationships and have a high expectation of being successful.
- Additional measures are being implemented to prevent problems in the future.

80 Scoring Guidepost

Recovery plans to rebuild depleted non-target species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts.

60 Scoring Guidepost

Rebuilding measures exist and are fully implemented, but are of largely unknown efficacy.

Score 80

With respect to endangered or threatened species, there is a good understanding of the functional relationships between the fishery and short tailed albatross and intervention measures have been shown to be effective in keeping impacts below levels which would harm recovery of the stock (100 guidepost). With respect to Steller sea lions there is not a good understanding of the functional relationships, but the actions taken are precautionary and should be expected, if the Pacific cod fishery is a limiting factor, to enable the populations to recover (80 Scoring Guidepost).

There are explicit management reference points with regard to overfished populations (see 3.2.1.1), and specified recovery management objectives, and the NPFMC is among the best in the country at rigorously applying these. However, these are only applied to assessed species. The current lack of analytical species-based assessments for skates and grenadiers (and lack of any detailed analysis of the effect of cnidarian bycatch) means that it is not possible to judge whether their individual species status is depleted or not, although available evidence (Gaichas et al 2004) is that catch rates for the species complex as a whole are currently within sustainable limits. In the absence of this knowledge, adoption of Tier 3 management is precautionary but without a species-specific assessment the effect of such management, including the relative distribution of fishing effort by species, it is not possible to be assured that even this precautionary approach will enable recovery of the most vulnerable species.

For many bycatch species there is not a particularly sound understanding of their functional relationships, despite the extensive PSEIS. At present, the Council is closely monitoring the catch of sharks and skates, and is encouraging the development of species level assessments (though from the current status of knowledge this may take some time) but its only information on grenadiers and Northern fulmar comes from the PSEIS and SAFE Ecosystem chapters.

Thus, although the structures are in place, the current state of analysis and classification of species as assessed or not does not lead to a situation where recovery of all impacted species is assured, even if it was clear that current intervention measures would always lead to a recovery of impacted stocks, because it is not possible to judge whether some of the populations of these species (especially skates) are depleted. The state of recovery plans for these species is best described as precautionary and based on incomplete data, the 80 guideline.

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.

The MSC certification team considered the primary management system to consist of the National Marine Fisheries Service and the North Pacific Fishery Management Council, and its strong association with various other management agencies that have a seat on the Council: the US Fish and Wildlife Service, the US State Department, the Pacific States Marine Fisheries Commission, the US Coast Guard, and the state fishery management agencies of Alaska (Alaska Department of Fish and Game), Washington (Washington Department of Fish and Wildlife), and Oregon (Oregon Department of Fish and Wildlife).

The management system indirectly includes the US Congress and the US Federal court system. Neither has a seat on the Council and neither participates directly in deliberations of the Council or NMFS in the Alaska. However, by its authority to make law, the Congress sets the overarching authority and responsibility for fishery management in the US (Magnuson Stevens Fishery Conservation and Management Act). In addition, the Congress sets in law specific management requirements for regions of the US (e.g., The American Fisheries Act), which preempt decision-making of the Council-NMFS process. The Congress further requires certain management or research actions through line item budget provisions (Steller sea lion research in Alaska). Thus, fishery management, in the US in general and Alaska specifically, reflects to a large degree the actions of the US Congress; fishery management in Alaska waters could look much different without the intervention of Congress.

The US Federal court system likewise plays an enormous role in the application of fishery management. When stakeholders in the management system perceive errors in the decisions made by the Council and NMFS, the Federal courts provide dispute resolution mechanism of last resort. Lawsuits by non-governmental organizations and the fishing industry have led the courts to overturn Council-NMFS decisions and to specify a process with milestones and products to rectify the errors. Thus, fishery management reflects the direct response to rulings of the courts and also the knowledge that future lawsuits may occur if management actions stray too far a field.

The review of the management system for Principle 3 will directly evaluate performance of the Council and NMFS, but will recognize the role and impacts of Congress and the Federal courts as appropriate.

The management system for the BSAI freezer- longline Pacific cod fleet of the Bering Sea-Aleutian Islands region is in many ways the same as that for Alaska Pollock, which received serious scrutiny and both praise and criticism (SCS 2005) during the pollock certification process the management paradox. The pollock certification review noted, on one hand, the indisputable success of the pollock management:

- subject to intensive scrutiny by leading scientists employing state-of-the art tools and techniques;
- research funding at an all-time high;
- a management system infused with skilled resource managers and legal advisors and managed pursuant to a remarkably open and inclusive process that stands well ahead of nominally identical processes elsewhere in the United States and other decision-making systems around the world; and
- increasing participation by native Alaskans.

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.

On the other hand, the review noted that the management system:
- approved removal each year of more than a million tons of pollock biomass from the North Pacific with limited information about what those immense removals mean for the region's ecosystem, portions of which are known to be in decline;
- responded to the declines with belated research focus and management measures developed after a population dropped to low levels that triggered protection of the federal Endangered Species Act; in spite of generally conservative catch levels operates 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 open, public, and supported by highly skilled and committed professionals, 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;
- has at times produced decisions that have been discredited and reversed by federal courts; and
- particularly the National Marine Fisheries Service, is divided internally and burdened by discord, and sometimes palpable animosity among different scientific and administrative factions.

The pollock review further noted that the management system had started a notable improvement of the issues that received criticisms.

The assessment team for the BSAI freezer longline Pacific cod certification conducted this review with the successes and problems identified by the pollock review in mind. We looked for parallels in Pacific cod and pollock management and for cases where improving trends noted by the pollock review translated into new successes. In general, the Pacific cod assessment team did not find signs that the Pacific cod management system continued the paradox noted by the pollock review. This conclusion resulted in part because some parts of the paradox did not apply to Pacific cod, and in part because the Pacific cod management system had adequately addressed failings. Where appropriate, the discussion the performance indicators below compare and contrast situations for Pacific cod and Alaska pollock.

Criterion 3.1 Structure and Strategies

The strategic framework for management is adequate for planning, conduct and evaluation of a management program consistent with MSC Principles and Criteria

Subcriterion 3.1.1

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.

Indicator 3.1.1.1 All elements in the fisheries management system, both national and international, and governmental and private, have clear-cut lines of responsibility. Their functions, particularly those involving interactions between elements, are clearly defined. *[Relates to MSC Criteria 3.]*

Elements considered in the scoring include
- Clear-cut indications of interactions between elements
- Explicit statements of fisheries management responsibilities for individual elements, especially regarding interactions between elements
- Demonstration of effectiveness of interactions

100 Scoring Guidepost

- Organizations with management responsibilities and their functions, particularly respecting interactions with other management elements, are clearly defined
- Interactions between elements are effective and run smoothly.

80 Scoring Guidepost

- Organizations with management responsibilities have been identified
- For the most part, functions and responsibilities requiring interactions with other management elements are explicitly defined
- In general, interactions between elements are effective and operate without serious difficulties

60 Scoring Guidepost

- Organizations interacting in the management process have been identified

- Functions and responsibilities for interactions with other management entities need refinement
- Interactions between elements exhibit occasional specific problems

Score 90

The applicant describes the management system in some detail (Bering Select, 2005). "Management of the BSAI cod fishery is under the authority of the Magnuson Fishery Conservation and Management Act of 1976 and the Magnuson-Stevens Act (PL 94-265 as amended through October 11, 1996). Both Acts are U.S. Federal Law. Under authority of these acts, the BSAI freezer longline fishery is managed by the Secretary of Commerce/NOAA/NMFS with recommendations from the North Pacific Fishery Management Council. These management authorities are clearly defined and functional. Working relations between the Council, which is headquartered in Anchorage Alaska, and NMFS Alaska Regional Office, headquartered in Juneau Alaska, have proven strong and effective over a 25 year period." The US Fish and Wildlife Service, the US Coast Guard, the Pacific States Marine Fisheries Commission, and the US Department of State (all non-voting members), and the state fishery management agencies are cooperation agencies. Each cooperating Agency is seated at the Council. Governors of Alaska and Washington recommend to the Department of Commerce additional at-large voting members.

The agencies work smoothly together, and with less tension than was reported during the pollock review. Differences in official agency position are reflected in non-unanimous votes. The voting mechanism, however, resolves the decisions of the Council through a majority in favor of any action. Therefore, the Council has a clear mechanism for resolving any dispute among Council members.

The stakeholders know the procedure for decision making at the Council. Analysis and testimony presented at the Council and lobbying of individual Council members to emphasize stakeholder positions gives stakeholders access and influence in the decision-making process. The BSAI freezer longline industry sector has a clear understanding of management authority of both Council and NMFS. As explained by the applicant, this industry sector is an active participant in the Council /NMFS fishery management process and they maintain a constant working relationship with NMFS. This industry understanding stems from reviewing fisheries specifications regularly published in the Federal Register, by management bulletins on seasons, catches and bycatches, and through their reporting to NMFS of vessel operations including fishing effort, catches, discards and products.

NGO groups have previously, during the pollock assessment, suggested that the Council-NMFS process does not meet sufficient precautionary standards (SCS 2005), which therefore causes flaws in the management process. For instance, the conservation stakeholders advised the Alaska pollock assessment team that, in their view, the North Pacific Council and NMFS did not employ an appropriately precautionary exploited stock strategy (Marz and Stump 2002). They argued that the process of setting single-species ABCs did 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, and by design.

The assessment team noted that lawsuits by conservation stakeholders have been needed in the past to push the management system into compliance with MSC standards. In the absence of those lawsuits, the Council-NMFS management system may not have met NEPA requirement, as determined by the courts. However, all current lawsuits were settled before the beginning of the certification review for the BSAI freezer longline Pacific cod fishery.

While we expect that the Council/NMFS achievements that settled the lawsuits will continue, some uncertainty in this regard lowers the score on what is an otherwise very clear-cut division of authority.

Indicator 3.1.1.2 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
- The management system provides for making estimates of all catches, landings and bycatch and for making annual assessments of the status of all stocks
- The harvest strategy addresses harvest mechanisms (such as gears, seasons) to achieve specific goals for economic efficiency, ecological impacts, social or cultural impacts, and other management measures.

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- There are long-term management objectives that seek to maintain stocks at high levels of productivity
- The harvest strategy, including catch control rule, is explicitly precautionary
- The management system provides for making estimates of all catches, landings and bycatch and for making annual assessments of the status of all stocks
- The harvest strategy addresses harvest mechanisms (such as gears, seasons) in response to management or allocation conflicts

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- There are general management objectives that seek to maintain stocks at high levels of productivity
- The harvest control strategy is consistent with objectives, but lacks specificity
- The harvest control strategy is conservative but not sufficiently precautionary, not taking into account of uncertainties regarding the status of the stocks
- The management system provides for making estimates of all catches, landings and bycatch and for making annual assessments of the status of all stocks
- The harvest strategy addresses harvest mechanisms (such as gears, seasons) on an ad-hoc basis

Score 95

Discussions under Principle 1 highlight the conservative nature of the stock assessment. The conservative stock assessment is then applied to a conservative management system. The Council/NMFS has developed a management system consistent with long term stock management objectives consistent with the Magnuson- Stevens Act Sec 301 National Standards, in part "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." Pacific cod in the BSAI is currently managed under Tier 3a of NPFMC's ABC and OFL definitions. Management under Tier 3a requires reliable estimates of projected biomass, *B40%*, *F40%* (for ABC), and *F35%* (for OFL). Under Tier 3a, the maximum permissible ABC depends on the relationship of projected female spawning biomass to *B40%*.

Fishery management regulations (http://www.fakr.noaa.gov/regs/summary.htm) 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 Pacific cod or as bycatch in other fisheries, and whether retained or discarded, is counted against the TAC.

Within this general National Fishery Management Program, the Council/NMFS have built and administered a BSAI management system for Pacific cod that undergoes a detailed annual review and status of stocks update based on both new survey and stock modeling evaluations. This process of updating the BSAI cod stock assessment is extensive, transparent, and peer reviewed at multiple levels before it is provided to management for final recommendations, allocation, and regulatory action.

Several "Precautionary Principles" are built into this management process, resulting in what has been described as a "deliberately conservative approach" and subject to more rigorous and better defined precautionary principles starting in 1996. For BSAI cod these include the use of a 1.0 catchability coefficient in the determination of biomass estimates from bottom trawl surveys, the determination of and the setting of catch targets (Allowable Biological Catch and Total Allowable Catch) well below the absolute catch limits (Overfishing Level), the establishment of harvest rates that are tied to stock size (lower harvest rates at lower stock size) and by using greater caution in the presence of greater uncertainty. While the BSAI cod catches have been conservatively managed at exploitation rates of 13-16 percent for most years of the past decade and at lesser rates during the decade before when uncertainties were greater, and while this stock is certainly regarded as well researched and well managed, some assessment weaknesses remain. Cod are difficult to age and have created problems in determining length at age. Studies to determine natural mortality estimates have produced varied results, and the Aleutian portion of the stock is surveyed by bottom trawl every two years (previously every three years) compared to every year in the dominant region of the Bering Sea.

The seasonal allocations provide some balance of catch efficiency during higher catch rate periods, no fishing during summer periods of lower meat yield and lower quality, product availability better matched to seasonal cod market demands, and the spreading out of cod catches over time to minimize adverse interactions with sea lions feeding on cod.

Long-term fishery management objectives for the BSAI groundfish fishery as a whole are listed in the Executive Summary (Section ES 8.1) of the Final PSEIS. The Council/NMFS is committed to the prevention of overfishing, promotion of sustainable fisheries and communities, preservation of food webs, management of incidental catch and reduction of bycatch and waste, the avoidance of adverse impacts to seabirds and marine mammals, reduction of fishery impacts on habitat, increasing consultations with Alaskan natives, and improving data quality, monitoring and enforcement.

The team concluded that there are only two counts on which this fishery falls short of scoring 100. The fishery is still in some small respects a derby fishery , and while the management system can maintain catch limits, economic efficiency suffers with derby fishing. Secondly, it was not clear to the team whether any account is taken by the management system of catches of the BSAI stock in Russian waters. These catches may be low, but to score 100 they would have to be explicitly considered in the management approach.

Indicator 3.1.1.3 The management system incorporates and applies a 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
- Consideration of the precautionary approach
- Consideration of impacts on non-target species and habitats over time and space

100

- The management system includes a plan with clear long-term objectives for managing ecological impacts of fishing that are explicit and consistent with MSC Principles and Criteria
- The plan includes all ecosystem components and is explicitly precautionary, accounting for uncertainty.

- The plan requires regular assessments of the status of ecosystem components, taking 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.
- Where appropriate, the plan includes mechanisms (such as representative areas set aside as no-take zones) to minimize identified impacts from fishing.

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- The management system 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
- Where appropriate, the plan includes control mechanisms to minimize impacts

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The management system takes into account ecological impacts of the fishery, but control measures lack specificity.

Score 85

Sections 404 and 406 of the M-S Act set requirements for essential fish habitat and incorporation of ecosystem principles into management, respectively. NEPA requires thorough assessment of impacts on the environment of any change to regulation of Federally-managed species.

The management system has expended considerable effort in the past several years to develop a strategy to manage ecological effects of fishing. Until the development of the PSEIS and EFH EIS ecosystem management approaches had been more reactionary rather than proactive. In spite of developing some general ecosystem principles (e.g., Witherell et al. 2000), the series of lawsuits concerning Steller sea lion BiOps, the PSEIS, and EFH indicates that the Council/NMFS did not lead in this issue. The PSEIS and the EFH EIS have raised the standard for evaluating fishery management in the context of ecosystem issues, and include clear long-term objectives for managing ecosystem impacts of fishing. Furthermore, the development of the Ecosystem chapter, the inclusion of a section in the Pacific cod SAFE (Thompson & Dorn 2004) and other SAFE reports on ecosystem effects, and the active development of research leading to better assessment of bycatch species (especially skates and grenadiers) and understanding the impacts of fisheries on benthos has generated a much more pro-active culture within the management system. The longline fleet itself has demonstrated, with respect to the development of mitigation methods for seabird bycatch, considerable willingness to work with, and accelerate, ecosystem based management approaches.

In addition to completing these environmental impact statements, the NMFS recently developed a Fishery Interactions Team (FIT) to conduct research on the fishery interactions with ecosystem components. The recent study to determine if the trawl fishery causes Pacific cod depletion and possible impacts on Steller sea lions demonstrates a proactive approach. The results lead to a conclusion that local depletion does not occur and to minimal impacts of Pacific cod fishing on Steller sea lions (Elizabeth Conners, AFSC, Seattle WA, pers. comm.).

The management system has implemented a complex mosaic of seasonal and permanent area closures in the BS-AI to protect Steller sea lions, to protect sensitive habitat, to prevent trawl expansion to unfished areas, and to reduce bycatch (http://www.fakr.noaa.gov/npfmc/analyses/BSAI83.pdf).

A management system should have an extensive list of ecosystem indicators, and the Ecosystem SAFE chapter includes such indicators. The Ecosystem SAFE presents an impressive amount of information for ecosystem assessment (models and analyses), ecosystem status indicators (physical, habitat, and biological) and management indices (fishery related). Several models of ecosystem response to fishing (e.g., fishing impacts on habitat (Rose 2002) and mass-balance food web models (Aydin et al. 2002; Aydin, AFSC, Seattle WA, pers. comm..) provide useful indicators for assessing impacts. However, whilst the Ecosystem chapter of the SAFE identifies indices of ecosystem health and consequences, it does not clearly identify the ecosystem-related problems that need resolution or management intervention.

The 2 million t OY for the BSAI, the closure of the AI to pollock, and the suite of closed areas throughout the BSAI (and Gulf of Alaska) incorporate explicit precaution in recognition of ecosystem impacts. The ABC calculations incorporate implicit precautionary measures; as described under Principle 1, the author of the Pacific cod assessment uses an ABC reduction factor (presently 0.9) to reduce the recommended ABC to account for uncertainty. Presentations by NMFS staff to the assessment team suggest a mechanism for explicitly incorporating ecosystem function into the ABC reduction factor calculation. The mass-balance food web model calculates effects of removals from a fish stock by fishing and results indicate that the fishery has only minor impacts on other species that serve as prey for Pacific cod or that prey on Pacific cod. Running the model for a variety of fishing levels for exploited species would allow for testing ABCs in an ecosystem context. By calculating the impacts on Pacific cod from variation in abundance of other species and the effects on other species from variations in Pacific cod abundance would allow the analysts to devise an ecological weighting factor to incorporate into the ABC reduction factor.

The score for this performance indicator substantially exceeds that for the walleye pollock fishery (SCS 2005), which received a 75. The pollock assessment team identified serious (but not disqualifying) problems with management for effects of fishing on the ecosystem, and set conditions for the pollock fishery that required:

- Credible scientific tests of the ecological impacts of the fishery on Steller sea lion foraging. The Pacific cod assessment team found that Pacific cod is a minor component of the Steller sea lion diet; that the FLL Pacific cod fishery does not operate in SSL critical habitat during the pupping period; and that the catch of Pacific cod by the freezer longline fleet does not substantially affect prey of the SSL. Therefore, condition 1 does not apply to the Pacific cod FLL fleet.

- Incorporation of specific ecosystem considerations and goals into the recommended ABCs. The Pacific cod assessment team recognizes minor effects of Pacific cod fishery removals on Steller sea lions, on other predators of Pacific cod, and on prey of Pacific cod, as determined from conclusions from the mass-balance models and the FIT depletion study. While the assessment team suggested a method to add an explicit ecosystem adjustment to ABC, the likely low impacts of current levels of Pacific cod fishing lowers the priority of this issue.

The management system recognizes that it has insufficient information to implement a full ecosystem-based management program. However, the progress that has been made on modelling ecosystem functions is impressive.

Indicator 3.1.1.4 The management system takes into account socioeconomic impacts in the development of management plans. *[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
- Consideration 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

- 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.
- The management system gives full consideration to the long-term socio-economic interests of Aboriginals and of people dependent on fishing for food and livelihood.
- Measures for allocating fishing opportunities or for controlling entry to the fishery do not undermine 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.

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- The fishery is substantially free from subsidies that directly and substantially promote overfishing or ecosystem degradation.
- Measures for allocating fishing opportunities or for controlling entry to the fishery do not undermine fishery and ecosystem management goals.
- The management system gives takes into account the long-term socio-economic interests of Aboriginals and of people dependent on fishing for food and livelihood.
- 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.

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- The fishery management system is not free of economic incentives for over-harvest or unproductive use of harvested species, or ecosystem degradation.
- Measures for allocating fishing opportunities or for controlling entry to the fishery are not always supportive of` achievement of fishery and ecosystem management goals. .
- The fishery management system gives relatively little consideration to the long-term socio-economic interests of Aboriginals and of people dependent on fishing for food and livelihood.

Score 85

The management system takes socioeconomic information into account, to the degree that it has available data.

The applicant advised that the BSAI freezer longline fishery for Pacific cod had regulations passed in 1995 to make it a limited entry fishery as soon as Amendment 23 to the BSAI groundfish FMP took effect in 1998 (Bering Select, 2005). New participation in the fishery was further limited by establishment of license limitation program (LLP) in 1998 and Alaska native participation increased by the creation of a multi-species community development quota system (CDQ) in 1998. These limits to participation were enacted with qualifying periods that limited new entrants but maintained existing participation at the existing level of capitalization. However, the fishery is substantially free from subsidies or financial incentives that would substantially promote overfishing or ecosystem degradation.

The management system could be considered to provide a subsidy by conducting management at taxpayer expense. In many countries, the Federal government has devolved management (and some research) to the industry. If the fishery participants paid for management costs, fishing may not occur in some areas with higher travel costs and lower CPUE, because revenue would no longer exceed costs. Given the habitat fished, the gear used, and the TAC control of the FLL Pacific cod fleet, little danger of overfishing or ecosystem degradation would result in the Bering Sea. The FLL Pacific cod fleet is more likely to fish the distant waters of the Aleutian Islands, which has habitat more sensitive than in the Bering Sea, as a result of the taxpayer-financed management. If the recent increase in fuel prices experienced in mid to late 2005 continue, higher costs could offset an interest in fishing the more distant areas.

Allocation of Pacific cod and roll over of uncaught allocations of other gears to the fixed gear fleets provides that the bulk of the harvest takes place with longline gear in Alaskan waters.

The Western Alaska Community Development Quota (CDQ) Program was created by the Council in 1992 to provide western Alaska communities an opportunity to participate in the BSAI fisheries that had been foreclosed to them because of the high capital investment needed to enter the fishery http://www.fakr.noaa.gov/npfmc/current_issues/CDQ/CDQ.htm. The purpose of the CDQ Program is to provide the means for starting or supporting commercial fisheries business activities that will result in an ongoing, regionally based, fisheries-related economy in Western Alaska. The program accomplishes this goal by allocating a percentage of all Bering Sea and Aleutian Islands quotas for groundfish, prohibited species, halibut, and crab to the six CDQ groups that represent eligible CDQ communities.

The Alaska Department of Fish and Game demonstrates that Alaska natives have used Pacific cod as subsistence http://www.subsistence.adfg.state.ak.us/. Pacific cod subsistence occurs in a wide variety of areas in the Bering Sea, Aleutian Islands, and Alaska Peninsula, for example Akutan, Atka, Egegik, Kodiak Island and Chignik. ADF&G manages subsistence fishing in state waters. At this time, the Council/NMFS management system has specific recognition of subsistence in Federal waters only for Pacific halibut. The Council/NMFS did establish a TAC for jig gear in the BSAI region, which gives native users an opportunity to fish commercially for Pacific cod from their typically small boats, without competing with the larger vessels that use pots, longlines, or trawls.

Management and reporting practices of the Council/NMFS provide short- and long-term predictability of likely harvest levels of Pacific cod. The 2 million t OY, and the large quantity of pollock that makes up the OY, give some stability in the overall harvests. The OY limits the overall exploitation of fish, which minimizes fishery induced fluctuations. The stock assessments reported in the SAFE documents provide projections out to 15 years into the future and account for changes in year class strength and fishing mortality. While projections may fluctuate from year to year and become less certain as time increases, they provide the best available information on future trends.

The fishery began limited entry management in 1995, with further restrictions from a license limitation program and the multi-species CDQ in 1998. However, overcapitalization of the fishery currently occurs and the lack of rights-based management reduces the economic efficiency of the fishery. Some fleet members have begun discussion of co-ops in the BSAI Pacific cod fishery, but the concept has not entered the regulatory process. Establishment of co-ops has the potential to benefit the BSAI FLL Pacific cod fleet.

The annual SAFE document includes a chapter on quantitative measures of the financial performance of the fishery by region, gear type, vessel size class, mode of operation and target fishery derived from required industry performance reports. The applicant advises that industry supplied performance information is limited to value of goods sold and does not include operational or other cost information necessary to fully evaluate the socioeconomic performance of the fishery (Bering Select, 2005). Amendments to FMPs require a socioeconomic impact analyses that provides information to the Council on expected socioeconomic impacts on the fishing industry, processing industry, dependent communities, small business entities, Aboriginals, and the U.S. consumer. These analyses are typically done in terms of gross revenues at risk because industry cost information is unknown. This constraint limits the analyses of net economic impacts of management actions and cannot fully evaluate allocation effects.

Subcriterion 3.1.2

The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral, and explicit basis

Indicator 3.1.2.1 The fishery is managed and conducted in a manner that respects international conventions and agreements and is not under any controversial unilateral exemption to an international agreement. *[Relates to MSC Criterion 3.1]*

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- The fishery is managed and conducted in a manner that complies with applicable international fisheries and environmental agreements and laws, respects fully the spirit of international conventions and agreements, and does not operate under any controversial unilateral exemption to an international agreement.
- The management system seeks and uses appropriately the advice of experts in international law.

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- The management system complies with applicable international fisheries and environmental agreements
- The management system does not operate under any controversial exemption to an international fisheries or environment-related agreement.

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There is no overt attempt by the management system to undermine international agreements or conventions

Score 95

The applicant (Bering Select, 2005) provided assessment team with information demonstrating that the Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery is conducted within the U.S. 200-mile EEZ and harvests only U.S. origin species. The fishery is conducted in a manner consistent with provisions of the U.N. Convention of the Law of the

Sea (UNCLOS), and the Agreement for the Implementation of the Provisions of the United Nations Convention of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. The fishery management also complies with the U.N. FAO Code of Conduct for long term management measures based on the best available science, prevention of overfishing, application of the precautionary approach, environmental impact assessment, protection of related species and biodiversity, consideration of artisinal and subsistence use, a transparent and accessible system and information, data collection, promotion of scientific research, enforcement, minimization of waste, discards, ghost fishing of lost gear and bycatch and negative impacts on associated or dependent species. The fishery is also governed by the U.S. High Seas Fishing Compliance Act of 1995 (16 U.S.C. §§ 5501-5509). This federal legislation implements the U.N. Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas.

The management of the fishery complies with the Migratory Bird Act Treaty requirement for consideration of direct and indirect impacts of federal actions, including allowing commercial fishery operations, on protected, threatened and endangered species. The fishery is monitored by a federal onboard observer program that provides estimates of seabird interactions with listed species and mortality on all species. Additionally, the Council and NMFS have instituted a number of regulations to further reduce seabird interactions in the fishery that comply with the U.N. "global seabird avoidance plan."

The International Pacific Halibut Commission (IPHC) is an international treaty organization that manages Pacific halibut resources for the U.S. and Canada. The Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery is managed to comply with agreed upon allowable levels of bycatch of Pacific halibut. Bycatch caps are established annually and the fishery is terminated when halibut bycatch limits are obtained. The IPHC works closely with the Council /NMFS and participates in the fishery management process in Alaska.

In the view of the assessment team, the evidence presented to the team shows that the management system is in compliance with international law and is devoting adequate attention to assuring compliance in the future. However, it is not clear whether the US-Russian Bering Sea commission considers pacific cod. The uncertainty of this in our opinion reduces the score slightly.

Indicator 3.1.2.2 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 non-compliance, severity of consequences of non-compliance)
- Integration of compliance requirements among the multiple domestic legal regimes that apply to the fishery.

- 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 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 fishery
- The management system regularly and consistently seeks and uses appropriately the advice of experts in domestic law, including independent experts

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- 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 often seeks and uses appropriately the advice of experts in domestic law.

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- The management system generally operates in accordance with all substantive and procedural aspects of applicable domestic law
- Harvest management decisions made by fishery managers only rarely are overturned or disallowed upon review by judicial authorities based on the same or substantially similar (i.e., chronic) violations of applicable substantive law
- The advice of experts in domestic law is sought only occasionally.

Score 80

There are currently no outstanding legal issues with BiOps for Steller sea lions, with the PSEIS, or with EFH. This situation marks a big improvement from the legal situation during the certification of the pollock fishery. The applicant (Bering Select, 2005) reviewed the history of federal court litigation in regard to the Council/NMFS compliance with NEPA and ESA in BSAI and GOA groundfish management. The U.S. District Court for the Western District of Washington had ruled that NMFS was not in compliance with NEPA with respect to North Pacific groundfish management and ordered NMFS to prepare a Programmatic Supplementary Environmental Impact Statement (PSEIS) for groundfish management. The U.S. District Court for the District of Columbia had ruled that the NMFS was not in compliance with NEPA with respect to promulgation of rules for designation of essential fish habitat as required in the Magnuson-Stevens Act and ordered NMFS to prepare a full EIS prior to implementation. The U.S. District Court for Western District of Washington repeatedly found infirmities in compliance by NMFS with the Endangered Species Act in regard to groundfish fisheries' impacts on Steller sea lions leading to a recent settlement, pending litigation, between NMFS and conservation stakeholders. NMFS testified before the U.S. Congress that the agency has had chronic problems successfully meeting the terms of NEPA and ESA as shown by recent court decisions. Although much of this litigation has been focused on the effects of the trawl fishery for pollock on Steller sea lions and NMFS protection of EFH, the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod is managed under the BSAI groundfish management plan that is implicated in both NEPA and ESA compliance issues. There is no pending litigation or court action seeking a halt or major modification to the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod.

NMFS and the Council have instituted steps to bring the management of the groundfish fishery in the BSAI and GOA into compliance with NEPA, ESA and the Magnuson-Stevens Act. A PSEIS has been prepared for the BSAI groundfish management plan. The PSEIS is extensive in its scope, depth and analytical approach and will serve as the analytical basis for better informed management decisions in groundfish fisheries. The Council and NMFS are in the process of completing an EIS to implement the EFH protection requirements of Magnuson-Stevens Act in compliance with NEPA. NMFS has established a NEPA coordination office that will advise the Council and NMFS on NEPA compliance for further fishery management actions. Hopefully, these actions will lead to full compliance with applicable domestic laws and reduce the need for court oversight of compliance through litigation.

The assessment team concluded that management for the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod would have undergone the same failings pointed out for the pollock fishery had it been in the same situation with Steller sea lions; EFH and PSEIS issues applied to the BSAI fisheries in general. As a result, the assessment team would score this performance indicator below 80 should litigation return that demonstrates non-compliance with domestic law.

Indicator 3.1.2.3 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 access rights
- Recognition of and respect for applicable subsistence or customary rights

100

- The fishery management system specifically recognizes access rights in fisheries management programs

- The fishery management system specifically recognizes subsistence and customary rights in the fishery including those of Aboriginal communities
- The management system includes processes for regular consultations with such communities regarding exercise of their rights
- The fishery management system provides a fair, efficient, predictable means to avoid and reconcile conflicts between legal and customary rights.

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- The fishery management system generally recognizes access rights in the fishery
- The fishery management system generally recognizes subsistence and customary rights in the fishery, including those of native communities
- The management system includes processes for regular consultations with such communities regarding exercise of their rights
- The fishery management system provides a fair means to avoid and reconcile conflicts between legal and customary rights.

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- The fishery management system generally recognizes access, subsistence, and customary rights in the fisheries

Score 90

The Alaska Department of Fish and Game demonstrates that Alaska natives have used Pacific cod as subsistence http://www.subsistence.adfg.state.ak.us/. The State of Alaska manages subsistence fishing for Pacific cod in state waters inside of 3 nm. Research by the ADF&G demonstrates that many native communities used non-salmon fish, including Pacific cod, for food. In most cases, non-salmon fish represented less than 10% of subsistence diet, so Pacific cod seems unlikely as a critical component. Pacific cod subsistence occurs in a wide variety of areas in the Bering Sea, Aleutian Islands, and Alaska Peninsula, for example Akutan, Atka, Egegik, Kodiak Island and Chignik.

At this time, the Council/NMFS management system has specific recognition of subsistence in Federal waters only for Pacific halibut. The Council/NMFS did establish a TAC for jig gear in the BSAI region, which gives native users an opportunity to fish commercially for Pacific cod from their typically small boats, without competing with the larger vessels that use pots, longlines, or trawls. The Community Development Quota system reserves 7.5 percent of the Pacific cod TAC in the BSAI for harvest by six CDQ groups representing 65 western Alaska coastal communities. As stakeholders, the CDQ groups have an active role in the fishery management process for Pacific cod and other CDQ species. The CDQ program has developed a diversified economy and provided significant employment opportunities for these Alaska communities.

The limited entry system in the fishery has been perceived by some stakeholders as benefiting a select group of economic stakeholders while effectively excluding others as new entrants. This is particularly the case for the pollock co-ops established under Congressional requirements of the AFA. This Act did not allow for the normal open discussion on issues, especially controversial ones, that occurs at Council meetings. However, the AFA does not apply directly to the FLL fleet. The Council is preparing an analysis of co-ops for the FLL fleet in preparation for a possible FMP amendment to allow co-ops for the FLL fleet. The FLL and other non-AFA fisheries operate under a moratorium and a more recent limited license program that provides access to those participants that had a proven history in the development of the fishery.

Criterion 3.2

The management program is implemented in an effective manner to meet MSC Principles and Criteria

Subcriterion 3.2.1

The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic, and institutional information.

Indicator 3.2.1.1 The management system solicits and takes into account relevant information. *[Relates to MSC Criterion 3.2]*

Elements considered in scoring include:

- Solicitation and treatment of scientific information
- 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

- 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
- There is an active program of familiarizing stakeholder groups with the management system’s principles and criteria for decision making

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- 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.

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- The management system has mechanisms to receive information and advice from stakeholders and outside technical sources, but does not vigorously solicit such information and advice.
- Information and advice is evaluated but there are no well defined procedures for making assessments and responding to such information and advice.

Score 85

The applicant (Bering Select, 2005) provided summaries of the Council/NMFS process of soliciting and using relevant information. The Council/NMFS function as managers of the BSAI groundfish resources and fishery, the GOA groundfish resources and fishery, and the BSAI crab stocks and fishery (together with the State of Alaska). Fisheries in the North Pacific and Alaska are big business, comprised of diverse user groups, and are competitive and complex. The management system in its entirety involves 15 Council members plus staff, 15 Scientific and Statistical Committee Members, 21 Advisory Committee members, 26 Groundfish Plan Team Members, 12 Crab Plan Team members and members on 20 different working committees. The NMFS management and fisheries research staff located in both Alaska and Seattle number several hundred.

The Council/NMFS management system has been in place for more that 25 years. Normally, five meetings occur each year and they follow a pre-announced schedule. Meetings are public. Detailed meeting agendas are noticed and widely distributed via mailing lists before each meeting and accessible on the Internet. Meeting results are published in a Council newsletter after every meeting. Council meetings typically last 8-10 days and are held in Alaska, Washington and Oregon – in that order of frequency. Each meeting consists of three components – an SSC meeting, an AP meeting, and the Council meeting. The SSC and AP meet concurrently in the same location as the Council and immediately preceding the Council meeting. Both the SSC and AP meeting may overlap the Council meeting. Each meeting component includes a "public comment period" which is open to all and requires a sign-up. Written materials providing meeting agenda, research results, and a wide variety of professionally prepared documents for development/analysis of management plan amendments are prepared and made available to the public at every meeting.

Meetings of the SSC, the AP and the Council are each led by an elected chairperson. Meetings are civil and orderly. Diverse views are commonplace, as is controversy, but the process is open and tolerant to all views following consistent public testimony rules. Public testimony on a single issue from 20-50 individuals is common which may require most of a day to complete. The public is also invited to provide comments to the Council in writing and are not required to attend the Council meeting to express their views. The process can be laborious and slow. The Council/NMFS process has commonly sought diverse “outside” views from around the nation and the world on controversial management topics like individual fishing quotas, bycatch management, community development quotas, and habitat protection to name a few. The process is very open to peer-review by industry, academia, lawyers, scientists and managers from other state and federal agencies, and a diverse environmental community.

When industry, fishery management, and the conservation community find common ground, the system can work extremely well. For example, following the catch of two short-tailed albatross in Alaskan waters in 1998, a Biological Opinion determined that a catch of two STAL in four years would initiate another Section 7 consultation and a possible closure of the fishery (USFWS 2003). The conservation community had an extensive program to reduce seabird bycatch worldwide, including in Alaska. The longline industry recognized the potential for closures as a result of STAL bycatch, and immediately began a proactive program to develop a strategy to reduce the probability of catching STAL. International research provided several measures with potential to reduce seabird bycatch. Cooperative research conducted with the University of Washington Sea Grant Program demonstrated the effectiveness of streamer lines in decreasing overall seabird bycatch (Melvin et al. 2001). With the support of industry, the Council/NMFS established initial regulations and subsequent improvements that dramatically reduced seabird bycatch in Alaska. Some stakeholders felt that the initial regulations were implemented without sufficient research and therefore premature. While some additional measures (e.g., weighted groundline) could further reduce seabird bycatch, the regulations have worked very well.

Conservation stakeholders commented during the pollock certification review (SCS 2005) that the Council/NMFS management system did not meaningfully consider information unfavorable to the industry, and operated under crisis management in response to litigation. The Pacific cod assessment team believes that the management system would have responded in a similar manner had the Pacific cod instead of the pollock fishery been involved in the past controversies, for example, involving Steller sea lions. As a result, the assessment team will continue to monitor the management system performance. To our knowledge, the management system has not established a review of the manner in which non-industry stakeholder information is used. However, we see that the establishment of a NEPA specialist in each Regional Council and in the NMFS regions will likely improve compliance with NEPA. The development of wide-ranging alternatives, analyses of impacts and consequences, and public hearings required by NEPA will more likely incorporate stakeholder information than in the past.

The Council/NMFS management system would increase its score by proactively recognizing approaching problems, requesting and gathering information relevant to the problem, assigning analytical expertise to options for solutions, and taking actions to prevent full development of the problem. The continued decline of fur seals in the Bering may represent such an approaching problem, even though the available evidence reviewed under Principle 2 does not point to a major interaction between fur seals, or fur seal habitat, and the longline cod fishery. The management system could also increase its score by establishing an internal review of how the system acquires, analyzes, and incorporates information, with a view to assure full stakeholder access.

Indicator 3.2.1.2 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

- The management system provides for direct representation of all significant public and private stakeholder interests
- The management system actions do not leave a perception of discrimination against significant stakeholder interests
- The management system operates pursuant to stable, predictable, objective procedures
- The management system produces decisions that take fully into account and, specifically and publicly address all significant stakeholder interests.

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- 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 specific interests.
- The management system operates pursuant to stable, predictable, objective procedures

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- The management system provides for involvement of representative groups from all parts of the fishing community, but may omit involvement by one or more significant stakeholder interests
- Procedures for considering information and advice from stakeholders are not specific and comprehensive
- Articulation of management decisions does not necessarily address concerns of stakeholders

Score 85

The Council process provides for access for all stakeholders. The applicant (Bering Select, 20005) pointed out that consists of four components: 1) the members of the Council, members of the Council's SSC and AP and Council staff, 2) representatives of the Secretary of Commerce/NOAA/NMFS responsible for the development, implementation, management and enforcement of the Fishery Management Plans of the Council, 3) the private stakeholders invested in the commercial fisheries being managed; and 4) the general public to include environmental groups, seafood consumers and coastal communities associated with the commercial fisheries being harvested, processed and managed. However, the Council is a political process and some stakeholders may feel slighted. The composition of the Council and its panels (SSC, AP, and *ad hoc* panels) tilts strongly to the fishing industry and fishery management agencies. Conservation stakeholders have less direct representation. However, the "fishing industry" consists of many components, often with competing interests. Depending on the composition of the Council, these industry stakeholders may also have varying direct representation. The AP and various *ad hoc* panels do offer a direct opportunity for stakeholders to participate in development of advice for the Council. Stakeholders have access to the Federal courts as an ultimate means of adjudicating differences.

Council membership itself consists of 15 members from Alaska, Washington and Oregon, which in turn likely represent 95 percent of the stakeholders in the Alaska groundfish and crab fisheries. These members, first at a public stakeholder level, are the Regional Director of the National Marine Fisheries Service in Alaska, the principal State officials of Alaska, Washington and Oregon with fishery management responsibility, the Director of the Pacific Marine Fisheries Commission, the Admiral of the 17th Coast Guard District, the Department of State Office of Marine Conservation and U.S. Fish and Wildlife Service. The remaining seven members are of private stakeholder interests from Alaska (5 seats), and Washington (2 seats), each appointed by respective State Governors for three-year terms not to exceed 9 years. These seven positions held by individuals over the years have represented fishermen of different industry sectors (longline, pot, trawl, crab, groundfish and halibut), fish/shellfish processing companies, trade association representatives from both harvesters and processors from various regions and representatives of the Community Development Quota groups. Over the years this mix of people has been highly diverse and certainly has covered a broad range of public and private stakeholders.

The government agency members represent all stakeholders from their jurisdictions. If stakeholders, whether an industry component or from the conservation community, have excellent access or do not have access to those agency members, that is part of the political process. Whether differential access occurs or constitutes a pattern of discrimination is difficult to define. Similarly, the proper distribution of representation among all possible stakeholders is difficult to define.

The pollock certification review (SCS 2005) found that the management system had yet to fully accommodate conservation stakeholders. The Pacific cod assessment team did not see evidence that this lack of accommodation was as serious as found by the pollock team. The lack of engagement by conservation stakeholders in the SCS assessment was due to the fact that the conservation groups in the Pacific Northwest have made a commitment to not participate in MSC processes until the MSC properly deals with what these groups consider to be significant technical issues. In our view, the fishery (industry and management), and the Council's management of BSAI fisheries in general, has become much more pro-active on those issues traditionally of concern to conservation stakeholders since the pollock review (see 3.1.1.3) and for instance now involves regular participation and experimentation on bird and mammal bycatch mitigation measures by Washington Sea Grant and other organizations (Melvin et al 2001, 2004, Melvin 2003) in collaboration with industry and NMFS.

Indicator 3.2.1.3 The management system assesses relevant information pursuant to objective, fair, and 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

- The management system allots analytical and deliberative resources in a manner that does not leave a perception 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.

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- The management system allots analytical and deliberative resources in a manner that does not show any distinct evidence of a pattern of discrimination against specific 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

- The management system does not have specific procedures for assessing information from outside sources, but , generally, gives fair consideration to such information
- The management system's approach to identifying and reducing sources of uncertainty affecting the quality of management decision-making is inadequate

Score 80

The NPFMC/NMFS management system has two primary venues for assessing relevant information. First, the AFSC and partners at state agencies and universities plan research, conduct surveys and experiments, and analyze and report results. This information is presented in scientific and technical reports, in the primary literature, and in Council SAFE documents. However, Section 3.2.3.1 documents that a substantial portion of research in Alaska is mandated by Congress, which circumvents the normal peer review process for selecting research proposals. Thus, many recommendations for research do not have full access to funding, and highest priority projects may not receive funding.

Second, the Council actively solicits proposals for changes to the FMPs, through an amendment process. Any stakeholder may submit a proposal with supporting information. All proposals go through review by the Council's Advisory Panel, and those with a scientific component also go through review by the Council's Scientific and Statistical Committee. The Council selects the highest priority proposals for development of an analysis, primarily by Council and NMFS staff, for public comment. The Council holds public hearings public and discussions on the amendments, and deliberation by the Advisory Panel and the Scientific and Statistical Committee are also open to the public. Analyses and decision making are in full public view, which leads to a deliberative process designed to foster transparency. However, a perception of inadequate representation of NGOs detracts from the score of this guideline.

Indicator 3.2.1.4 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

- 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 is clearly open to all significant 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
- The management system makes substantial progress toward resolution of outstanding disputes

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- The management system has established mechanisms for resolution of significant disputes arising within the system
- The management system's dispute resolution procedures is clearly open to all significant participants and stakeholders

- The management system makes meaningful progress toward resolution of outstanding disputes

60

- Dispute resolution mechanisms in place are theoretically adequate but are not used in a consistent manner
- The management system demonstrates some meaningful progress toward resolution of outstanding disputes

Score 80

The Council component of the Council/NMFS management system resolves disputes by majority vote as required in section 302 of the Magnuson-Stevens Act. From a procedural standpoint on a given issue, following staff presentations and discussion of written materials, following recommendations by the AP and the SSC, following public comment and following Council debate and typically following legal Council input, the Council chair calls for motions and votes on motions that result in selection of favored action alternatives. Majority vote is final at the Council level. Council vote is held in public session and clearly open to all in attendance. Council meetings in their entirety are fully recorded and tapes of meetings are openly available to the public to purchase from a private contractor who records the meetings. Accordingly, Council debates, disputes and dispute resolution are fully documented both in public and in recorded record. Detailed Council minutes, including motions and role call votes are prepared in written form and distributed to the public and provided to the Secretary of Commerce. Council actions typically move forward on pre-determined time schedules. Means to resolve disputes (voting) seem effective in making reasonable progress toward achieving end goals like completion of a plan amendment.

Following final Council actions, the NMFS prepares draft and final regulations/rules and publishes them in the Federal Register. Final decision and any final dispute resolution lies with the Secretary of Commerce. All stakeholders have an opportunity for input prior to the decision by the Secretary of Commerce. The draft regulations/rules are subject to public comment, and the Department of Commerce (through NMFS) can reject Council action and return the action to the Council for further consideration and decisions. Any disputes remaining following adoption of NMFS final regulations/rules can be resolved through the Federal court system.

As noted above in 3.2.1.1-3.2.1.3, the Council process is inherently political. Directors of state and Federal agencies on the Council should represent all stakeholders; any failure in this representation is a failure of the political system. Without an amendment to the M-S Act that directs a change in the Council member selection procedure, the current political nature of the NMFS/Council process will continue.

Because Alaska residents on the Council, exclusive of the NMFS Alaska Regional Director, hold six of the 11 votes, some observers believe that the Council dispute resolution voting procedure shows evidence of discrimination against the non-Alaskan stakeholder. The

“Alaskan Block” of 6 votes has been and continues to be a subject of controversy in dispute resolution.

As non-Alaskans may have a perception of discrimination within the Council system, so too may the conservation stakeholders. The conservation stakeholders believe that they do not have adequate representation (SCS 2005), particularly a seat or seats, on the Council, which could lead to a more proactive approach to ecosystem-based management. During the pollock certification review, the conservation stakeholders pointed to an unwillingness or inability for the Council/NMFS system 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, and especially with the issue of Steller sea lions. While a long history of litigation exists in the Alaska region, the Pacific cod assessment team believes that resolution of the lawsuits pertaining to Steller sea lion BiOps, to the PSEIS, and to EFH have largely relegates litigation as an issue to the past. If the Council/NMFS continue an active NEPA process, we foresee a likelihood of such disputes diminishing in the future. NEPA coordinators and utilizing the experience gained with successful environmental impact statements (alternatives and analyses) reduce the procedural and factual factors that lead to lawsuits.

Indicator 3.2.1.5 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

- 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

- 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.

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- The management system regularly presents decision makers with a reasonable number of carefully analyzed alternatives for action, but alternatives do necessarily reflect all substantial proposals made by stakeholders
- Decision makers sometimes find information provided by technical sources to be inadequate, particularly in respect to assessing risks
- Decisions makers do not consistently rely on information presented to them

Score 90

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 FMP plan amendment process normally proposes, drafts, debates, and presents to the public a set of action alternatives that are subsequently analyzed for public review and comment. Alternatives are subject to review by the Council family (AP, SSC and committees) and subject to review by NMFS legal council and by the public to insure that adopted alternatives "book-end" a reasonable suite of alternatives including status quo. Alternatives under consideration are provided by Council staff to the Council family, and to the public, in written form at an early stage of the plan amendment process. Procedures provide for a full airing of draft alternatives and the opportunity by Council family or by the public, to propose the addition or modification of alternatives before a final suite of alternatives is chosen by Council vote. Typically, a favored alternative is also chosen and identified as such.

The ABC/TAC setting process also offers explicit alternatives. The stock assessment analyst runs seven prescribed fishing mortality scenarios, ranging from maximum allowable fishing mortality to no harvest. From these runs and using other information on the condition of the stock, the analyst recommends an ABC. The tier system prescribes the reference points for fishing mortality and maximum sustainable yield, and allows more conservative, but not less conservative, recommendations. The tier system was selected from an earlier series of alternatives for setting benchmarks and reference points. We consider the harvest strategy to provide as useful information as one could expect. The Council sets ABC below the overfishing level and does not set ABC above that recommended by its scientific advisors. The Council/NMFS sets TAC below the ABC.

The completion of the PSEIS and the EFH EIS has raised the Council/NMFS process to a more appropriate level under the MSC system. Both recent EISs offered a wide range of alternatives. Even though these EISs resulted from lawsuits, the products showed a high level of thought and evaluation. The Council/NMFS has selected preferred alternatives from these EISs currently that are currently undergoing evaluations as FMP amendments.

Overall, the Pacific cod assessment team concludes that the management system provides as clear, relevant, and useful information for use by decision makers as we know anywhere.

Subcriterion 3.2.2

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.

Indicator 3.2.2.1 Catch levels are set to maintain high productivity of the target population and the ecosystem *[Relates to MSC Criterion 3.10]*

100

- Catch levels are set regularly in a precautionary manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are set 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

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- Catch levels and/or catch arrangements are regularly set in a precautionary manner directly tied to, and limited by, target species population goals, including goals for population subcomponents
- Catch levels are 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
- No clear-cut indications of substantial declines in productivity of the target species or the ecosystem as a consequence of harvest levels

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- Catch levels are varied in relation to target species population goals, but setting of goals and the degree of conformity with such goals is variable

- Setting of catch levels takes into account ecological considerations, but only in a subordinate and variable manner
- Evidence of the effects of the management program on productivity is equivocal

Score 95

Extensive discussions under Principles 1 and 2 provide greater detail for this indicator. The Council/NMFS use harvest control rules that meet or exceed international standards and are precautionary. The overfishing level exceeds ABC, ABC usually exceeds TAC, and TAC usually exceeds catch. An ABC adjustment factor takes uncertainty into account. Lower exploitation rates as biomass falls result in ABC declining faster than biomass.

The 2 million t OY sets a precautionary level of harvest for the combined BSAI fisheries, as the sum of ABCs for all species may reach 3.5 million t. There is no indication that productivity of Pacific cod is declining as a consequence of fishing. With minor exceptions, exploitation rates have been well below the allowable rate of exploitation, let alone limit rates, of exploitation (see PI 1.1.5.4). Following a series of above average year classes in the late 1970s and early 1980s, population abundance peaked in 1987 and has been declining since. Recent declines in population abundance are a consequence of average to below average recruitment over the past 15 years. During this period only the 1999 year-class was classified as above average abundance.

The PSEIS has set management policy for incorporating ecosystem effects of fishing into the management system. The several ecosystem models in production and under development offer an opportunity to test the sensitivity of the ecosystem to various harvest strategies. These models suggest that productivity of Pacific cod has not declined as a consequence of fishing. The past ABC and TAC for the Pacific cod fishery have resulted in catches fairly low in proportion to the productivity of the Pacific cod resource in the Bering Sea. Following a series of above average year classes in the late 1970s and early 1980s, population abundance peaked in 1987 and has been declining since. Recent declines in population abundance are a consequence of average to below average recruitment over the past 15 years. During this period only the 1999 year-class was classified as above average abundance.

Indicator 3.2.2.2 There are gear restrictions and mandatory 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

- The management system applies an established, widely accepted program to minimize catch and discard mortality 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 and discard mortality 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

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- The management system applies an established, widely accepted program to minimize catch and discard mortality 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 and discard mortality of non-target species, as well as evidence of a trend toward productive use of non-target species that are not released.

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- The fisheries management system has a system for minimizing catches and discard mortality of non-target species, including the setting of targets, but it is difficult to assess its effectiveness
- Multi-year trends in catch levels of non-target species are equivocal
- Progress in encouraging productive uses of previously discarded non-target species is slow.

Score 85

The applicant provided information (Bering Select, 2005) of management measures applied to the FLL fleet to reduce discard mortality and to increase utilization. These measures will not result in the absolute avoidance of catches of non-target species in commercial fisheries. However, measures can be taken to minimize bycatch of non-target species, minimize mortalities of some but not all species of bycatch, and reduce the unproductive use of non-target species that cannot be released alive. The Council/NMFS management system has developed and implemented numerous programs applied to the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod, and other directed groundfish fisheries, to deal with bycatch, reduce halibut bycatch mortality, quantify mortality rates of bycatch of halibut, require full utilization of cod and pollock catches, and increase the processing and utilization of non-target species.

Discards of species with TAC are assumed to have a discard mortality rate of 100%, and are deducted from the TAC. The Council/NMFS require full retention and utilization of Pacific cod and pollock. In the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod, all cod, including undersized cod that might otherwise be discarded, and all pollock bycatch must by regulation be retained (Council BSAI Plan Amendment #49). This regulation was first implemented in 1998. The “improved retention and improved utilization” policy has increased production and decreased discards of undersized cod and all pollock since implementation. In addition to the recent requirement of full utilization of cod and pollock in the Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod, this fishery has reportedly been more fully utilizing bycatch amounts of skates (the primary bycatch species) and flounder. Because all fisheries catch numerous species, some of which are retained but not targeted, the Council/NMFS establishes incidental catch allowances for managed species. Vessels in a fishery are not allowed to retain restricted species at more than the incidental catch allowance. These procedures recognize the operational realities of the fisheries, but help assure that the fisheries do not exceed the TAC.

The fleet worked with the Halibut Commission to devise the careful release program, and provided the initial documentation of hook straightening as a careful release method. The discard mortality rate estimated from observer data declined about 50% after the start of careful release, to about 11%. In addition to reducing discard mortality rates, the management system helps reduce overall bycatch rates by assigning a zero halibut bycatch mortality during summer months when bycatch rates are highest and Pacific cod quality lowest. These requirements allow the industry to remain below the halibut bycatch mortality limits, which would cause the fishery to close, set by the Council/NMFS. The longline fishery in the BSAI has not had a bycatch-caused closure for a substantial number of years.

The fleet had a leading role in the research and development of bird bycatch reduction devices, and the number of seabirds killed by the fishery has declined in recent years. Because seabirds hooked during setting have no chance of survival, reducing the hooking rate is very important. The paired streamer lines have made big progress in this effort. However, additional reductions of seabird bycatch would occur if the FLL (and other longline vessels) used weighted ground lines that would more quickly sink the line and hooks below the diving depth of seabirds (Melvin et al 2001, 2003).

The fishery has a fairly low diversity of discards, and has increased the utilization of species formerly discarded – skates, in particular. Other than for Pacific halibut (Trumble et al. 2000, 2002), the management system has little information on survival of other discarded species. Many species, especially those with swim bladders caught at depth, have very poor survival when caught by longlines. However, other species, such as skates, have a potential to survive although this is not guaranteed and needs to be tested. Such testing has not, to our knowledge, been undertaken. However, in the absence of such experiments, the Council/NMFS system uses a conservative estimate of 100% mortality for discarded fish other than halibut. Freezer longline vessels (and many other longline vessels) remove fish from the hooks with an automatic hook stripper. The hook stripper works by passing the ground line through closely-spaced vertical rollers. The vertical rollers restrain fish (and most anything else), and rip the fish from the hook as the groundline continues through the rollers. Circle hooks used by North Pacific longline vessels tend to hook around the jaw of the fish. The hook stripping reduces survival of fish by ripping through the jaw. The careful release requirement prohibits hook stripping for Pacific halibut; a similar requirement for other organisms with survival potential would decrease discard mortality.

Our review of associated species under Principle 2 identified the direct effects of the fishery on fulmars, skates, grenadiers and gorgonians to be of potential concern: potential because detailed species-specific assessments have not been done, but available evidence suggests that the impacts are not unsustainable. The fishery could certainly do more to reduce the impacts, especially on birds and skates, where as indicated above different fishing practices and/or gear could be investigated. Thus although the impacts are probably not unsustainable, the fishery scores only just above 80 because minimization of mortality does not seem to be an over-riding, continuing concern to the management system.

Indicator 3.2.2.3 The management system accounts for catch of non-target species. *[Relates to MSC Criteria 3.10, 3.17]*

100

- There is 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

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- 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

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- The management system requires monitoring and accounting of catch of non-target species, but the effectiveness of the measures is uncertain
- Information available to managers from monitoring of catches of non-target species is barely adequate.

Score 90

The monitoring and accounting of non-target catch in the FLL fishery is among the best in the world. The applicant reports (Bering Select, 2005) that the required vessel logbook record and the federal onboard observer program record non-target species catches and reports whether they were retained or discarded. Federal observers monitor approximately 70 percent of the BSAI freezer longline fleet on a 100 percent basis and 30 percent of the fleet on a 30 percent basis. Federal observers directly monitor up to one-third of the hooks on each set they observe and count, weigh and collect biological information on both target and non-target species. They obtain total landed weight of target and non-target species from the vessel operators as well weight of retained and discarded catch by species from the vessel logbook. The vessel operators are required to maintain accurate logbooks showing fishing effort, catch by species including non-target species, and retained and discarded catch by species even when federal observers are either not onboard or not monitoring the catch. The AFSC scientists believe the bycatch sampling system in place in the fishery provides the basis for accurate estimations of total bycatch by species in the fishery. The AFSC and the Council provide annual estimates of bycatch of non-target and protected species in the fishery.

Bycatch of non-target species is not beneficial to the fishing operation as it precludes the harvest of typically higher valued target species. Vessel operators tend to avoid high bycatch areas and concentrate their gear where Pacific cod dominate the catch. However, as a fishery approaches its quota and closures appear imminent, fishers often increase the race for fish with concomitant increases in bycatch. Variations in bait and hook size can also reduce bycatch and are employed in the fishery. IR/IU regulations require that the fishery retain all Pacific cod and pollock caught if fit for human consumption. The fishery routinely retains some amount of other non-target species with economic value such as, rockfish, Greenland turbot, arrowtooth flounder, and skates. Bycatch rates in the fishery are relatively high, ranging from 12 to 20 percent of the overall weight harvested in recent years and probably reflect the relative abundance of the non-target species on the fishing grounds rather than operational changes in the fishery.

The majority of the bycatch consists of species like skates, sharks, grenadier, sculpins and starfish with little or no commercial value that are not target species of other fisheries. The Council has set a TAC for several of these species in the category of "other species." The presumptive annual exploitation rates of sculpins and skates is each about 4 percent of the estimated survey biomass for the BSAI groundfish fishery overall. In 2004, the catch of other species exceeded the TAC (but not ABC), and went to prohibited status in October (http://www.fakr.noaa.gov/2004/hal2004.pdf).

Operational changes have been instituted to reduce the mortality of Pacific halibut bycatch (see P.I. 3.2.2.2 above for a more detailed discussion of halibut mortality reduction measures). Additional management measures have been instituted by regulation to protect interactions with protected species such as Steller sea lions and seabirds (see P.I. 2.2.2.1 for a detailed discussion of protected species interactions and protection measures).

The relatively high bycatch of non-target species, minimal measures to reduce bycatch and discard mortality of the non-target species, and the less-rigorous observer monitoring of FLL less than 125 ft in length have reduced the score on this indicator. However, the Council/NMFS have started evaluation of a proposed amendment to the FMP that would require all FLL vessels, not just those greater than 125 ft, to carry observers for 100% off fishing days. The Assessment Team recognized the benefits of enhanced observer coverage, and will monitor efforts to approve and implement this measure.

Indicator 3.2.2.4 The management system minimizes adverse impacts on habitat. *[Relates to MSC Criteria 3.10, 3.13]*

100

- The management system conducts continuing studies 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

- The management system has information on the effects of the fishery on habitat
- The management system has taken significant actions to restrict fishery gear and practices to reduce fishery impacts on habitat

60

The management system takes general steps to minimize destruction of habitat by fishing.

Score 80

Fishery managers have some direct scientific information on the impacts of bottom longlines on the habitats of the North Pacific, but no explicit monitoring occurs of habitat impacts from the longline fishery. However, the limited evaluations of longline gear generally find that longlines have minimal impacts on habitat (SERO, NERO, EFH EIS).

We recommend that further studies be directed at understanding what potential impacts longlines could have on various benthic habitats in the area of the fishery.

Indicator 3.2.2.5 The fishery does not use destructive fishery practices.
[Relates to MSC Criterion 3.14]

100

- Fishery management system prohibits use of destructive fisheries practices
- There is no evidence that destructive fishery practice is occurring
- The management system promotes the use of selective gear that minimized impacts.

80

- Fishery management system prohibits use of destructive fisheries practices
- There is no evidence that destructive fishery practice is occurring

60

There is no evidence that destructive fishing practices take place within the fishery.

Score 95

Pacific cod harvested by the FLL fleet are caught with bottom longlines. Compared to most mobile fishing gear, longlines cause substantially less damage, but the extent of this damage is not explicitly known. Furthermore, there seems to be no research into ways to identify the damage and minimize it. Thus the fishery drops below the 100% score.

Numerous laws and regulations apply to North Pacific fisheries 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 (http://www.epa.gov/owow/OCPD/marpol.html; http://www.uscg.mil/hq/g-m/gmhome.htm).

There is no evidence available to suggest that the loss of fishing gear in the fishery results in significant "ghost fishing" or otherwise damages the ecosystem. Once the hooks are no longer baited they offer minimal catching potential. The mainline, although made of synthetic material and probably persistent for years or longer, probably results in little damage to the habitat and offers minimal entanglement potential. Habitat damage and entanglement risks are likely higher in the AI than in the BS, because of the substantial vertical relief of the AI and the muddy-sandy bottom of the BS.

The assessment team found that uncertainty about bottom longline impacts on the benthos, and the continued catch of seabirds represent the most serious potential destructive practice of the BSAI FLL fleet. As noted in previous sections, the longline fishery has substantially reduced seabird bycatch. The use of integrated weight groundlines could reduce seabird catch even further, because their sink rate is more uniform, but evidence from other areas (the Ross Sea: CCAMLR, 2004) suggests that because they sit tighter on the sea floor their catch of grenadiers, skates and benthos may be higher than traditional lines. This conflict needs to be considered in detail before changes to gear is contemplated.

Indicator 3.2.2.6 The management system provides for rebuilding and recovery, where applicable. *[Relates to MSC Criterion 3.10]*

100

- The management system sets goals 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

- The management system sets goals and has demonstrated a trend toward achieving rebuilding and recovery goals for all over-fished stocks

60

- The management system takes steps to rebuild over-fished stocks, but lacks approaches 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 90

The Council/NMFS system has had little experience with rebuilding overfished groundfish stocks, largely because no overfishing occurred during the Council's tenure. No Alaska Region groundfish stocks are currently considered overfished (http://www.nmfs.noaa.gov/sfa/reports.htm). During the period of the foreign groundfish fishery in the 1960s and 1970s, foreign fishing depleted stocks of Pacific Ocean perch. When the Council/NMFS began management of the fishery and controlled foreign fishing, it required reduced harvest rates on POP. Over time, the POP stock fully rebuilt and now supports commercial fishing.

The Council/NMFS have determined that a number of king and Tanner crab stocks are overfished (2004 crab SAFE Document). Many of these species have been closed to fishing since 1999. Abundance of these stocks has increased slowly in some cases, and continued to decline in others. Scientists have not reached a consensus for the cause of fluctuations of Alaskan crab stocks, but opinions include climate change and effects of fishing.

The management system has strict goals for recovery of overfished stocks should any stock reach this condition. Federal rules require Councils to generate stock recovery plans within one year of a stock being designated as overfished. Stock recovery must be achieved within 10 years (or one generation time, dependent on the species life history). Councils must demonstrate that stock recovery plans have better than a 50 percent probability of achieving the required recovery.

Council harvest control rules allow fishing on groundfish stocks provided that current stock biomass is more than 5 percent of target stock biomass. Exceptions to this constraint are imposed on the pollock stocks which cannot be fished if stock biomass falls below 20 percent of target biomass (see Supplement to the Endangered Species Act-Section 7 Consultation Biological Opinion and Incidental Take Statement of October 2001).

Over the past 28 years, precautionary management practices of the Council and NMFS have prevented BSAI groundfish stocks from experiencing overfishing. Strict protocols are followed to determine whether stocks are overfished or approaching an overfished condition. Current regulations allow stocks to continue to be fished while rebuilding, although the Council may elect to prohibit fishing if they deem it necessary.

The fishery does not reach a score of 100 because the management system does not prohibit fishing when stock abundance falls below limit reference points. Fishing would not be prohibited until biomass falls to $B_{5\%}$. The assessment team considered that prohibition on fishing should occur between $B_{5\%}$ and the MSST.

Indicator 3.2.2.7 The management system applies closures or restrictions when catch limits are reached. *[Relates to MSC Criterion 3.10]*

100

- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent over-runs 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

- The management system has demonstrated a consistent ability and willingness to close or restrict the fishery to prevent significant over-runs 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

The management system applies closures or restrictions in a manner that generally prevent catch limits being exceeded, but from time to time over-runs occur.

Score 100

The NMFS-Council management system has a substantial in-season process in place to close fisheries when they reach catch limits (http://www.fakr.noaa.gov/sustainablefisheries/inseason/default.htm). In-season management oversees more than 500 separate groundfish quotas and prohibited species catch limits that result in an annual harvest of 4.5 billion pounds of seafood taken by over 2,000 vessels. About 100 actions either opening or closing fisheries occur annually. The in-season management catch accounting information system and routine catch reports are necessary to support monitoring, industry compliance and enforcement of quotas and to disseminate timely catch and bycatch information to interested members of the public. The groundfish catch accounting system utilizes observer data, shoreside processor landings data, and processor weekly production report data, accounts for data at the haul (observer) and delivery (shoreside landings) level and can track all the current quotas. Vessels report weight of each product type, and NMFS converts products to round weight equivalents using specified product recovery rates. Vessels greater than 125 feet in length have observers on board for all fishing days, and vessels between 60 and 125 feet have observers on board for 30% of the days.

The Bering Sea and Aleutian Islands Freezer/Longline fishery for Pacific cod is subject to two seasonal closures by NMFS notice during a calendar year. Closures occur if and when any one of three management restrictions occur - if a seasonal cod allocation to their sector is harvested by the sector's fleet, if a seasonal halibut bycatch mortality allocation to their sector is reached, or if a season time/area closure occurs. Noticed closures are enforced by the USCG and by NMFS under laws of the Magnuson-Stevens Act with stiff penalty (sec 307-310). Bering Select, (2005) report that the domestic BSAI freezer longline sector, fleet wide, has been effectively managed without violations for fishing beyond closures. However, while the overall management system has demonstrated a consistent ability and willingness to close the fishery to prevent significant over-runs of catch limits, the system does not have a perfect tract record. In three consecutive years (1992, 1993 and 1994) of the last 25 years, data presented in Thompson and Dorn (2004) show that the BSAI cod catch by all industry sectors combined exceeded both TAC and ABC by amounts of about 14.3 percent, 1.7 percent and 1.4 percent, respectively. Since 1994, the fishery has been managed within quota without overruns. We note that in the three years of quota overruns, only the overrun of 1992 could be considered "significant". We also note that in each of those three years, TAC was set equal to ABC, leaving no room for error in catch tabulations. In the last four years of management, the BSAI cod TAC was set below the ABC to add greater precaution that the ABC would not be exceeded due to an error that could occur in NMFS catch accountings.

Indicator 3.2.2.8 The management system uses 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

- The management system has demonstrated a consistent ability and willingness to research the need for establishing no-take zones, MPAs or other mechanisms as appropriate to achieve harvest limit or ecosystem protection goals
- The management system has identified criteria and standards for establishment of closed areas or other control mechanisms.

80

The management system has responded to an identified need by establishing no-take zones, MPAs, or other control mechanisms, as appropriate.

60

The management system has some idea of the need for these mechanisms, and has established some control mechanisms (although their effectiveness has not been evaluated adequately).

Score 85

The Council and NMFS have established a widespread mosaic of permanent and seasonal closed areas to restrict bycatch, to protect protected resources (especially sea lions), and to restrict harvest
http://www.fakr.noaa.gov/sustainablefisheries/seis/final062004/Appen/App_F/app_f3.pdf.
The NPFMC recently developed an EIS for the implementation of Essential Fish Habitat (EFH) protection measures as required by the Magnuson-Stevens Act and supported by

litigation (http://www.fakr.noaa.gov/habitat/seis/efheis.htm). NMFS analyzed existing knowledge of the impacts of fishing on habitat and found that current fishing practices do not threaten EFH. However, following the precautionary principal the Council chose as a preferred alternative to close a large portion (59 percent) of the AI management area to non-pelagic trawl gear and prohibit all bottom contact gear, including bottom longline, in six areas of known coral gardens covering about 380 sq. km. Additionally, the Council designated approximately 18,130 sq. km on Bowers Ridge and the Ulm Plateau in the AI as HAPC sites where further research and identification of areas of high coral concentration may lead to additional fishing gear restrictions. The EFH protection measures are currently progressing through the Council process. Although the Council did not designate any measures to minimize the impacts of fishing on EFH in the Bering Sea, they directed NMFS to continue to study the need for such measures.

The fishery did not score higher on this indicator because the Council and NMFS have not yet conducted an evaluation of the benefits of closures, nor are any of the current closures the result of "consistent ability and willingness to research the need for establishing no-take zones, MPAs or other mechanisms as appropriate to achieve harvest limit or ecosystem protection goals".

See the discussion of performance indicators 2.2.1.2 and 2.2.1.3 for more information on the ecological impacts of closed areas.

Indicator 3.2.2.9 The management system minimizes operational waste.
[Relates to MSC Criterion 3.15]

100

- The management system has established rules to minimize operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.
- 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

The management system has established rules to minimize operational waste, including monitoring and enforcement

60

Many 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 .5" in diameter prior to discharge.

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 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 pacific cod.

In the view of the assessment team, the management system has imposed significant restrictions on the fisheries to minimize operational waste, resulting in very efficient fisheries throughout the region.

Subcriterion 3.2.3

A comprehensive research program is conducted.

Indicator 3.2.3.1 There is a research program that provides for short- and long-term needs for technical guidance and information required for management of target species and protection of the ecosystem. The research program is appropriate for the size and scale of the fishery. *[Relates to MSC Criterion 3.8]*

100

- The research program, in conjunction with monitoring activities, provide the management system with reliable, on-time information on the status of the stocks and of the ecosystem required for management
- Research plans provide continuing, significant progress in scientific understanding of:
  - Fluctuations in target and impacted non-target species
  - Effectiveness of harvest strategies
  - Effects of fishing on the ecosystem
  - Ecosystem management strategies
  - Economic considerations related to the fishery
- There are regular reviews of the content and scope of the research program by peer groups and stakeholders.
- Regional bodies determine all research priorities, and the record shows that decisions are predominately in line with scientific advice.

80

- The research program, in conjunction with monitoring activities, provide the management system with reliable information on the status of the stocks and of the ecosystem.
- Longer term research plan periodically provides improvements in basic scientific understandings of:
  - Fluctuations in target and impacted non-target species
  - Effectiveness of harvest strategies
  - Effects of fishing on the ecosystem
  - Ecosystem management strategies
  - Economic considerations related to the fishery
- There is regular peer review of the content and scope of the research program
- Regional bodies determine many research priorities using scientific justification, and political influence is minimal with few contradictory priorities.

60

- The research program contributes substantially to the information base required for management of the fishery but more comprehensive approaches are needed
- There is some longer-term research contributing to improvements in basic understandings of fluctuations in target and impacted non-target species.
- The research plan is general in nature.

Score 80

Fishery research in the BSAI area occurs primarily through NMFS, although numerous organizations provide funding for or participate in various projects: US Congress, the North Pacific Council, Sea Grant, the North Pacific Research Board, the states, private institutions, and environmental groups. While many of these participants communicate among each other, no overall coordinating body for research program exists. The National Research Council (NRC) http://books.nap.edu/catalog/10836.html noted that Congress exerts substantial influence on fishery research nationally, through line items in the US budget for specific projects. The fishing industry and other stakeholders in Alaska lobby members of Congress, which often results in Congressional action. The NRC found that Congressional action has supported research, but that earmarked and line item funding has the following drawbacks: inconsistency with research needs across regions, unpredictability from year to year, possible unfair or inequitable allocation of funding, deductions from NMFS base budget, and failure to recognize increased agency costs to implement programs. The funding for sea lion research in Alaska is an example of Congress specifying research topics in Alaskan waters. While sea lion and other funding for research has been high, NMFS staff noted during presentations to the Pacific cod assessment team that funding for vessel charters has declined. The NRC further noted that NMFS has no control over the funding cycle. Funds may be allotted for a fiscal year too late in the year to conduct specific research projects, and cause the loss of a field season. These issues make accurate research planning difficult.

The applicant noted that the AFSC conducts numerous research programs on groundfish in Alaska (Bering Select, 2005), including Pacific cod http://www.afsc.noaa.gov/species/Pacific_cod.htm). The federal onboard observer monitor system, vessel logbook program, and processor reporting provides reliable, on-time information on the fishing effort and harvest by target species. The AFSC conducts a large-scale annual stock assessment trawl survey in the BS and triennially in the AI. A variety of information is collected during these surveys in addition to relative stock abundance information. Non-commercial fish and invertebrate species are also assessed; biological information on age, growth, fecundity, predator-prey relations and other information is collected and added to the knowledge database for these species. The stock assessment scientists with the AFSC are constantly reviewing and testing new and innovative approaches to stock assessment modeling for Pacific cod to improve stock assessment estimates and more accurately project trends in abundance. NOAA recently dedicated a new research vessel the *Oscar Dyson* to the Alaska program. When another new ship joins the NOAA fleet on the West Coast in 2006, the former NOAA ship *Miller Freeman* will also be dedicated to Alaska fishery research.

NMFS has conducted research on the effectiveness of seabird avoidance techniques, radio tag studies of Steller sea lion feeding migrations, and estimating and reducing mortality in bycaught Pacific halibut. NMFS is conducting ongoing research in identifying areas of critical habitat to managed species and areas of special concern including AI coral gardens (http://www.afsc.noaa.gov/Quarterly/jas2003/featurelead.htm). The Fisheries Oceanography Coordinated Investigations (FOCI) is a joint research program between the NOAA's Pacific Marine Environmental Laboratory and the AFSC on oceanographic processes that affect fishery resources in Alaska. The FOCI program is evolving into a larger-scale research effort, the North Pacific Climate Regimes and Ecosystem Productivity (NPCREP) study that includes investigations of climate change effects on ecosystems and managed species productivity. The National Science Foundation (NSF) is also funding the Bering Sea Ecosystem Study (BEST) to investigate ecosystem processes and climate change in the Bering and Chukchi Seas with funding dedicated through 2007. AFSC scientists participate in international research efforts through their participation in the North Pacific Marine Science Organization (PICES) (http://www.pices.int/). Much of the joint research is focused on the use of ecosystem processes in fishery management.

Within the confines of line item projects, the Council/NMFS system does a good job with research. The system works especially well for providing information and analysis for target species under single species management, but is less advanced in planning and researching other species or ecosystem effects. Improvements in long-term planning would lead to increased scores. While the Alaska Region conducts large amounts of productive research, neither the Region nor the Science Center has constructed a full and complete research plan.

Indicator 3.2.3.2 There is adequate funding to support the research strategy *[Relates to MSC Criterion 3. 8]*

100

- 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 long-enough time scale to allow continuity of all major stock assessment and ecological interactions research program.

80

- Funding for research is adequate to address major short-term gaps in knowledge but inadequate for in-depth long-term research
- Funding is adjusted to meet requirements of newly identified research priorities

60

- Funding is barely adequate to meet short-term information needs for stock assessment and ecological interaction research.

Score 80

According to the NRC http://books.nap.edu/execsumm_pdf/10387.pdf, *the mission of NMFS has expanded greatly since its inception along with the legislative mandates for managing marine fisheries. Although the NMFS budget has grown, the base budget has remained almost constant, with most of the increase going to earmarked projects. When NMFS's science failed under legal challenge, there were indications that part of the underlying problem may have been insufficient funding to accomplish the mandated science. A first step would be to examine the current and projected costs of data collection, analysis, and management under all of the legal mandates that guide NMFS management to assess whether resources are adequate to comply with existing laws*.

As described in Section 3.2.3.1, the Council/NMFS system conducts an impressive amount of research. As the applicant notes (Bering Select, 2005), much of the funding for this research comes directly from the NOAA annual budget that is dependent upon Congressional appropriations. The level of funding can change from year to year depending upon the whim of the Congress. However, the funding levels have shown some reasonable stability, to the point that allowed the conduct of the major research projects described in 3.2.3.1. The team has concerns with the process of funding for fishery-related projects and the lack of a long-term plan for research. Ideally, the long-term plan would include explicit coordination with Sea Grant, the North Pacific Research Board, and the states.

Subcriterion 3.2.4

The management system effectively monitors all relevant aspects the fishery

Indicator 3.2.4.1 The management system has procedures to measure and record and evaluate the procedures that provide the basis for assessments of stocks and program performance. *[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

- The management system has a comprehensive monitoring program
- The monitoring programs established in the fishery have been subject to outside review and comment
- 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"
- 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

80

- The management system has 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

- The management system has a monitoring program.
- The monitoring programs have not been subjected to external review.
- To the extent available, 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.

Score 90

The NMFS PSEIS (http://www.fakr.noaa.gov/sustainablefisheries/seis/intro.htm Section 2.5.2) describes an impressive array of data collections and analyses to assess and monitor program. Sources of information to design, implement, and monitor the specific goals and effects of FMPs include catcher vessel and processor logbook records, data collected by trained observers, detailed location data collected with automated Vessel Monitoring System (VMS) units, and independent research carried out by government agencies and academia. Participation in the BSAI and GOA groundfish fisheries requires one or more federal permits and permit holders must comply with record-keeping and reporting requirements to report groundfish harvest, discard, receipt, and production (50 CFR 679.5). (Also see links to record keeping and reporting forms and related information at http://www.fakr.noaa.gov/rr/default.htm.)

Catcher vessels and buying stations must record fishery information in logbooks daily. Processors (motherships, catcher/processors, shoreside processors, and stationary floating processors) are required to record fishery information in logbooks daily and summarize the information on production reports that are submitted weekly to NOAA Fisheries. To assist the agency in determining fishing effort by species, processors also report the start and end of their participation in fishing operations (called check-in/check-out reports). To assist the agency to develop a catch history for catcher vessels delivering to motherships, each mothership must issue ADF&G fish tickets for each groundfish delivery. Information common to all the logbooks includes: participant identification; amount and species of harvest, discard, and product; gear type used to harvest the groundfish; area where fish were harvested; and observer information.

As a condition of their fishing permits (see 50 CFR 679.50), fishing vessels and processors are required to provide various levels of observer coverage for their operations. Vessels 125 feet (ft) or greater in length overall (LOA) are required to carry observers for 100 percent of their fishing days. Vessels that are 60 ft LOA or greater but less than 125 ft LOA are required to carry observers for 30 percent of their fishing days. (Vessels under 60 ft LOA are not required to carry observers.) Observers are also required at shoreside and floating processing plants according to processing rate, with 100 percent observer coverage of plants processing 1,000 mt or more per month, and 30 percent observer coverage of plants processing 500 to 1,000 mt per month.

Groundfish observers collect catch and other biological data throughout the groundfish fishing season. Information is recorded on catch composition of targeted, bycatch, and prohibited species; total groundfish catch, location of fishing, and fishing effort; length and weight frequency measurements, collection of age structures (scales/otoliths), and retrieval of tags from tagged fish. Observers also record the species, number, and condition of marine mammals observed in the area or interacting with the fishing gear. For seabirds, observers are not directly required to record interactions with gear unless it results in a direct take; however, we note that there are some ad hoc observations provided on an inconsistent basis concerning bird sightings and bird/gear interactions. Even in the case of recording direct take of seabirds by longline gear, there is no distinction made in whether birds are dead or relased alive in survivablke condition. At present, the assumption is that all birds caught are considered dead, which most likely results in an overestimate of seabird mortality assocuiated with the fishery.

Beginning in 2002, all fishing vessels participating in the directed fisheries for pollock, Pacific cod or Atka mackerel using pot, hook-and-line, or trawl gear are required to have onboard an operable VMS, which provides regular vessel location data to NOAA Fisheries via satellite (40 CFR 679.7(a)(18)). This requirement is necessary to monitor fishing restrictions in Steller sea lion protection and forage areas. The VMS determines vessel location in latitude and longitude and transmits this data along with a vessel identifier number and the time of transmission to NOAA Fisheries.

For estimating abundance and distribution of Alaska's groundfish resources, the AFSC's primary methods include area-swept bottom trawl surveys for shellfish and bottomfish stocks; echo-integration/trawl surveys (acoustic surveys) for the dominant semipelagic stocks, such as pollock; and longline surveys for measuring relative abundance of valuable bottom species that inhabit the deeper waters of the upper portion of the continental slope. The AFSC's comprehensive survey strategy consists of a suite of annual and triennial bottom trawl and acoustic surveys alternating among the eastern Bering Sea (EBS), Aleutian Islands, GOA, and the West Coast regions. Annual surveys have been conducted for the crab and groundfish stocks in the Bering Sea, spawning pollock in Shelikof Strait of the GOA, and Bogoslof Island area of the Bering Sea, and sablefish in the GOA. In recent years, NOAA Fisheries bottom trawl surveys have annually sampled an area of approximately 600,000 square kilometers (km), an area that includes as many as 1,400 sampling stations. The winter and summer acoustic surveys cover about 15,000 km of tracklines annually. The annual Alaska sablefish longline survey covers about 95,000 square km and fishes 16 km (7,200 hooks) of longline per station over a depth range of about 660 to 3,960 ft at about 90 sampling stations.

The catch monitoring programs employed in the Alaskan groundfish fishery have been reviewed periodically. A review of the Observer Program analytical and statistical procedures was conducted in 1997 (Versar 1997), of the Observer Program compliance with their stated goals and objectives in 2000 (MRAG Americas 2000), and of the Observer Program sampling methodology in 2000, 2001, 2003 (MRAG Americas 2000, 2002, 2004).

Summaries of annual catch data, accessible to all interested parties, are available on the Internet at the NMFS Alaska Region web site (http://www.fakr.noaa.gov/sustainablefisheries/catchstats.htm). Detailed Observer catch data, accessible only to government employees and/or those designated access for legitimate fisheries management purposes, are maintained in a master database at the NMFS/AFSC in Seattle. Observer data are routinely accessed by fisheries managers in the Alaska region. Aggregate Observer data are available to the public subject to confidentiality constraints. NMFS survey data are available to researches typically within the year the survey was conducted. Haul by haul survey data are also provided to the public upon request. Summaries of survey results and reports to fishermen are provided through the NMFS/AFSC web page (http://www.afsc.noaa.gov/) as they become available.

The fishery monitoring and stock assessment research activities in the Alaskan groundfish fisheries are extensive. One would be hard pressed to find a more comprehensive system for fisheries of this magnitude. Nevertheless, there are "blind spots" in the data systems. Vessel's less than 60' LOA are exempt from the at-sea Observer Program; while these vessels represent a small volume of annual catch, they are numerous and the nature of their fisheries tends to be more localized. In the Pacific cod freezer longline fishery, there are no vessels less than 60' LOA. Observer coverage of the 60 to 125 foot vessels allows vessel operators to select, within some boundaries, trips where observers are carried. NMFS would prefer to assign observers randomly. Observer deployment is controlled in part by the agreements between fishing vessels and contract observer providers. The Council and NMFS have been working with the fishing industry to find a mutually acceptable process for funding and deploying observers that would remedy this deficiency, but as yet have not been able to do so.

Fishery independent surveys are conducted annually on the Bering Sea shelf, but biennial (historically, triennially) in the Aleutian Islands and the continental slope of the Bering Sea. More frequent surveys in the AI would reduce year-to-year variability in fishery independent estimates of resource abundance. The in-season catch accounting system, formerly known as the "blend", was updated in 2003. Data systems specialists have made reports to the Council (see SSC minutes, February, 2005) on the changes; but the revised system remains undocumented except to those working with it.

Subcriterion 3.2.5

The management system ensures that there is a high degree of compliance in the fisheries with management measures and directives regarding fishing practices required by the system

Indicator 3.2.5.1 Fishing operations are fully compliant with regulations and directives regarding fishing practices developed by the management system. *[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

- The management system has 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
- Prosecutions, convictions and penalties for violations are sufficient to act as strong deterrents to illegal fishing

80

- The management system has a comprehensive compliance and enforcement system
- There no indications of consistent violations in the fishery
- There is a record of consistent enforcement and prosecution of violations in the fishery
- Convictions and penalties for prosecuted violations are generally adequate to deter illegal fishing

60

- The management system has an enforcement system.
- Information on the extent of compliance is incomplete.
- Prosecutions, convictions and penalties for violations do not appear to act as strong deterrents to illegal fishing.

Score 90

NOAA Fisheries and the NPFMC have set a series of regulations for the management of the Pacific cod fishery. The US Coast Guard and the NOAA Fisheries Office of Law Enforcement (OLE) have joint responsibility for enforcement activities necessary to implement the management program. The freezer-longline Pacific cod fleet falls under this joint enforcement. The USCG and OLE report to the NPFMC at each council meeting on enforcement actions. During the most recent year of USCG Enforcement Reports (Dec 2003 – Oct 2004 http://www.fakr.noaa.gov/npfmc/misc_pub/misc_pub.htm), longline vessels in the Bering Sea received violation notices for safety and logbook violations; one logbook violation included failure to log prohibited species catch. The USCG did not report any violations for activities such as fishing in closed areas or out of season. Penalties for violations in this management system are provided in the Magnuson-Stevens Act. Civil penalties and permit sanctions are defined in section 308 and include fines up to $100,000 for each violation. Penalties for criminal offenses are defined in Magnuson-Stevens Act section 309 and include fines up to $100,000 and imprisonment for not more than 6 months, or both. Details of this USCG enforcement program are provided on the NPFMC web site at http://www.fakr.noaa.gov/npfmc/. Details of the OLE program are provided at http://www.nmfs.noaa.gov/ole/investigations.html.

Observers are an integral part of the NOAA Fisheries/NPFMC management program. The AFSC manages the North Pacific Groundfish Observer Program (NPGOP), one of the largest observer programs in the world. The NPGOP collects information on vessels, gear, retained and discarded catch, and interactions with marine mammals, sea birds, and habitat http://www.afsc.noaa.gov/refm/observers/default.htm. The success of the NPGOP has provided NOAA Fisheries and the NPFMC with extensive data for use in analyzing fishery performance and for in-season management. The NPGOP is unique among US observer programs in that vessels contract with private contractors to obtain required amounts of observer coverage. Vessels longer than 125 ft carry observers on all fishing days, while those between 60 and 125 ft in length must carry observers 30% of fishing days. This service delivery model raises concerns for conflict of interest, as vessel managers determine when the 30% vessels will carry observers. Most freezer longline vessels in the Bering Sea are greater than 125 ft.

The comprehensive enforcement and observer coverage for the Bering Sea fisheries in general and the low number of reported violations from the freezer longline fleet demonstrate effective control of the management system.

Criterion 3.3

The performance of the management system is regularly and candidly evaluated and adapted as needed to improve.

Subcriterion 3.3.1

Evaluations are conducted in a systematic fashion and the system responds positively to appropriate recommendations for change.

Indicator 3.3.1.1 The management system provides for internal program evaluation and review. *[Relates to MSC Criterion 3.3]*

Elements considered in scoring:
- Frequency
- Candor (accuracy and precision)
- Transparency
- Participation

100

- 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
- Evaluation results demonstrate that the management system is effective or rapidly improving

80

- The management system has a provision for an objective system for evaluation of management performance that is conducted periodically as need arises
- The criteria for and results of the on-going evaluation of management performance are made public.
- Evaluation results demonstrate that the management system shows improvements

60

- The management system may conduct internal expert program reviews, but does not do so in a systematic manner

Score 75

This indicator is about a systematic approach to internal reviews of scientific and technical processes and outcomes. Our findings are consistent with other evaluations of the NPFMC and NMFS system conducted under the MSC program. No evidence has been provided for meeting the 80 scoring guideposts, which require an objective measure of performance, that these objective measures are publicly available, and that there is evidence of improvement as a result of these internal reviews. That is not to say that reviews are not conducted. There were a number of points made to us of the types of reviews conducted by NMFS. It is the lack of objective performance measures that are publicly available that cause the assigned score.

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 fishery management procedures and outcomes. The client can fulfill this condition by working cooperatively with other North Pacific fisheries that have been certified under the MSC program or are under going MSC certification and are working with NMFS to address this condition.

Indicator 3.3.1.2 The management system provides for external program evaluation and review. *[Relates to MSC Criterion 3.2, 3.3]*

Elements considered in scoring:
- Frequency
- Candor (accuracy and precision)
- Transparency
- Participation

100

- The management system conducts an independent, open, 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
- Evaluation results demonstrate that the management system is effective or rapidly improving

80

- The management system conducts independent, expert reviews of all significant aspects of management performance on an as required basis
- The criteria for evaluation of management performance are set outside the management system
- The results of any independent review are made public

- Evaluation results demonstrate that the management system shows improvements

60

- The management system may conduct external expert program reviews, but does not do so in a systematic manner

Score 90

Within the NPFMC, there is regular review of the groundfish fisheries as a whole, including those for Pacific cod, during which, as outlined above, individuals and outside agencies have full opportunities for critical comment. In considering amendments to fishing plans, the advice of the 22 member AP, comprising fishing industry groups, environmentalists and consumer groups and the Commission's 12 member SSC, including highly respected outside scientists, is sought. NPFMC's Plan Development Team solicits peer reviews of stock analyses and its meetings consider outside views regarding its analyses (NOAA 2004, Chapter 2 and Appendix B).

Court challenges to the Council's and NMFS' decisions regarding the groundfish fisheries have often required managers to explain and justify their management actions and outside agencies have conducted a number of intensive reviews of the federal fisheries management process. Of particular note were reviews by the National Research Council of the National Academy of Sciences (NRC 2003), the Pew Oceans Commission (2003) and the U.S. Committee on Ocean Policy (2004). The latter Committee recommended that NMFS, working with the Regional Fishery Management Councils, should develop a process for independent review of the scientific information relied on by SSCs. Such a review would be conducted annually by regional scientists to certify that the correct data and models are being used. Periodic enhanced reviews should be conducted to evaluate the models and assessment procedures. To ensure that these reviews are independent, a significant proportion of the reviewers should come from outside the region and be selected by a group such as the Center for Independent Experts.

As pointed out by the 2004 MSC pollock review, Congressional committees have conducted oversight and legislative hearings regarding the region's fisheries and the Magnusson/Stevens Act itself is subject to periodic review in the light, among other things, of fisheries events.

In addition, the Council and NMFS frequently turn to outside sources for technical advice, particularly regarding scientific matters and monitoring issues. For example, culminating in a 2002 report, a panel of seven distinguished outside scientists conducted a review of the Alaskan groundfish fisheries directed toward describing current management strategies, determining whether the current quota setting approach was consistent with the MSA and if it was considerate of ecosystem needs (Goodman et al. 2002). This review closely paralleled the type of "enhanced Review" proposed, as described above, by the US Ocean Policy Committee.

From the foregoing, the Team considers that the management system within which specific management measures for Pacific cod are developed is subject to frequent and comprehensive external performance reviews. The overall management system, focused in NPFMC/NMFS, prescribes assessments needed as the basis for management, the nature of the fisheries and the levels and nature of exploitation that is allowed, taking into account the impacts of the fisheries on allowable harvest levels on the area's ecology.

Thus the Team considers that, as required by this indicator, the management system (the NPFMC Groundfish Fisheries Management Plans) adequately provide for external program evaluation and review.

8 TRACKING, TRACING FISH AND FISH PRODUCTS

Under Section 4, a brief description is given of the monitoring of catch in the 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 assessments were not conducted for any of the fish moving from boat deck into the processing segment of the fishery either onboard or at shoreside processors. 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, PUBLIC COMMENT, AND OBJECTIONS

Peer reviews were conducted during early December 2005. Three peer reviews were conducted. The peer reviewer comments are attached as Appendix 1.

Public comments were received from only two sources. The first was from the client and required a minor change to the number of freezer longline vessels fishing for Pacific cod. We originall y reported 37 and there are 39. The other comments, still minor, were two comments made by the Royal Society for the Protection of Birds (RSPB). The first comment noted that observers do not have to systematically record all interactions with birds at sea, only the birds taken as bycatch and sightings of listed species. We checked this fact and made changes to the text. The second comment was that we did not include some citations of ongoing work on seabird bycatch mitigation that the freezer longline fleet was engaged in with scientists from Sea Grant. We made no specific change to the text as we already mentioned that work is going on and that is continuing. We note for the record that some of this work will be completed and required to be submitted to the assessment team as part of ongoing surveillance audits should the fishery be certified.

10 CERTIFICATION RECOMMENDATION AND PERFORMANCE SCORES

It is the assessment team's consensus judgment that the management of the US Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery complies overall with the MSC Principles and Criteria. Therefore, SCS as the certification body of record recommends that the fishery be issued a joint fishery/chain of custody certificate pending (1) the submission of an Action Plan to show how the applicant intends (content and timelines) to meet the proposed conditions, (2) approval by the certification body (SCS) of the action plan, and (3) proof of a contractual agreement between the applicant and an accredited certification body that assures the applicant will continue to comply with all specified conditions, all required surveillance audits, and all other responsibilities under the MSC program.

The fishery achieved a normalized score of 80 or above on each of the three MSC Principles independently (Principle 1 – 87.01, Principle 2 – 84.82, and Principle 3 – 85.78). 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 few 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 7 (below) shows the overall results of the evaluation in terms of Principle 1, 2, and 3.

Table 7. Scoring assigned to fishery using AHP.

Principles, Criteria, Subcriteria, and Indicators	AHP Assigned Weight	AHP Assigned Score
MSC Principle 1	.333	87.01
MSC Criterion 1	.750	
SC 1.1.1	.167	
Indicator 1.1.1.1	.169	100
Indicator 1.1.1.2	.169	85
Indicator 1.1.1.3	.169	85
Indicator 1.1.1.4	.107	90
Indicator 1.1.1.5	.280	80
Indicator 1.1.1.6	.107	90
SC 1.1.2	.167	
Indicator 1.1.2.1	.200	95

	Indicator		
	1.1.2.2	.200	95
	Indicator		
	1.1.2.3	.200	100
	Indicator		
	1.1.2.4	.200	90
	Indicator		
	1.1.2.5	.200	90
SC			
1.1.3		.167	
	Indicator		
	1.1.3.1	.762	80
	Indicator		
	1.1.3.2	.238	90
SC			
1.1.4		.167	
	Indicator		
	1.1.4.1	.333	95
	Indicator		
	1.1.4.2	.333	100
	Indicator		
	1.1.4.3	.333	95
SC			
1.1.5		.167	
	Indicator		
	1.1.5.1	.250	80
	Indicator	.167	80

		1.1.5.2		
		Indicator 1.1.5.3	.167	85
		Indicator 1.1.5.4	.167	80
		Indicator 1.1.5.5	.250	80
	SC 1.1.6		.167	
		Indicator 1.1.6.1	.500	80
		Indicator 1.1.6.2	.500	100
MSC Criterion 3			.250	
		Indicator 1.3.1	.500	80
		Indicator 1.3.2	.500	85
MSC Principle 2			.333	84.82
MSC Criterion 1			.333	

SC			
2.1.1		**.200**	
	Indicator		
	2.1.1.1	**.333**	**90**
	Indicator		
	2.1.1.2	**.333**	**100**
		.333	**90**
SC			
2.1.2		**.200**	
	Indicator		
	2.1.2.1	**.333**	**90**
	Indicator		
	2.1.2.2	**.333**	**80**
	Indicator		
	2.1.2.3	**.333**	**80**
SC			
2.1.3		**.200**	
	Indicator		
	2.1.3.1	**.500**	**80**
	Indicator		
	2.1.3.2	**.500**	**75**
SC			
2.1.4		**.200**	
	Indicator		
	2.1.4.1	**.500**	**80**
	Indicator		
	2.1.4.2	**.500**	**80**

	SC			
	2.1.5		.200	
		Indicator		
		2.1.5.1	.222	90
		Indicator		
		2.1.5.2	.222	90
		Indicator		
		2.1.5.3	.222	85
		Indicator		
		2.1.5.4	.222	75
		Indicator		
		2.1.5.5	.111	80
MSC				
Criterion				
2			.333	
	SC			
	2.2.1		.750	
		Indicator		
		2.2.1.1	.333	90
		Indicator		
		2.2.1.2	.333	90
		Indicator		
		2.2.1.3	.333	90
	SC			
	2.2.2		.250	
		Indicator		
		2.2.2.1	1.00	85

MSC				
Criterion				
3			**.333**	
	SC			
	2.3.1		**1.000**	
		Indicator		
		2.3.1.1	**.400**	**85**
		Indicator		
		2.3.1.2	**.400**	**80**
		Indicator		
		2.3.1.3	**.400**	**80**
MSC				
Principle				
3			**.333**	
SCS				
Criterion				
3.1			**.333**	
	SC			
	3.1.1		**.500**	
		Indicator		
		3.1.1.1	**.286**	**90**
		Indicator		
		3.1.1.2	**.286**	**95**
		Indicator		
		3.1.1.3	**.286**	**85**
		Indicator	**.143**	**85**

	3.1.1.4		
SC 3.1.2		.500	
	Indicator 3.1.2.1	.333	95
	Indicator 3.1.2.2	.333	80
	Indicator 3.1.2.3	.333	90
SCS Criterion 3.2		.333	
SC 3.2.1		.286	
	Indicator 3.2.1.1	.200	85
	Indicator 3.2.1.2	.200	85
	Indicator 3.2.1.3	.200	80
	Indicator 3.2.1.4	.200	80
	Indicator 3.2.1.5	.200	90
SC 3.2.2		.286	
	Indicator	.200	95

	Indicator 3.2.2.1		
	Indicator 3.2.2.2	.100	85
	Indicator 3.2.2.3	.100	90
	Indicator 3.2.2.4	.100	80
	Indicator 3.2.2.5	.100	95
	Indicator 3.2.2.6	.100	90
	Indicator 3.2.2.7	.100	100
	Indicator 3.2.2.8	.100	85
	Indicator 3.2.2.9	.100	85
SC 3.2.3		.143	
	Indicator 3.2.3.1	.500	80
	Indicator 3.2.3.2	.500	80
SC 3.2.4		.143	
	Indicator 3.2.4.1	1.00	90

	SC 3.2.5		**.143**	
		Indicator 3.2.5.1	**1.000**	**90**
SCS Criterion 3.3			**.333**	
	SC 3.3.1		**.1.000**	
		Indicator 3.3.1.1	**.333**	**75**
		Indicator 3.3.1.2	**.333**	**90**
		Indicator 3.3.1.3	**.333**	**80**

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 (Bering Select) takes the necessary steps to meet conditions, it'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, it will be the applicant'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 Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery are:

- Bering Select 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.
- Bering Select must agree by contract to be responsible financially and technically for compliance with required surveillance audits by an accredited MSC certification body, and a contract must be signed and verified by SCS prior to certification being awarded.
- Bering Select 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, Bering Select shall develop an 'Action Plan for Meeting the Condition for Continued Certification' and have it approved by SCS.

11.2 SPECIFIC CONDITIONS FOR CONTINUED CERTIFICATION

In addition to the general requirements outlined above, Bering Select must also agree in a written contract with an accredited MSC certification body to meet the specific conditions as described in Section 9 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 2

2.1.3.2 Any gear lost during fishing operations is documented. There is adequate knowledge of gear losses and their impacts on the ecosystem.

Score 75
<u>Condition</u>

Institute a monitoring program for gear lost (including lines and hooks discarded in offal) in the longline fishery and a study to assess the impacts of such gear loss on the receiving ecosystem, particularly its effects on benthos. If the results of these studies suggest that particular fishing areas are creating significant and unacceptable impacts on sensitive benthos, identify ways of reducing gear loss and implement a program to monitor improving performance in this aspect of operations.

Indicator 2.1.4.1 Levels of acceptable impact are determined and reviewed.

Score 75
Condition

Acceptable levels of catch are not currently calculated for some key species, of which the most important is Northern fulmars. Assessments of the status of this species should be extended to specifically identify acceptable bycatch levels and confirm that current bycatch levels are within these acceptable limits.

Indicator 2.1.5.4 Fishery impacts on habitat structure are known.
Score 75
Condition

Same 2.1.3.2

MSC PRINCIPLE 3

Indicator 3.3.1.1 The management system provides for internal program evaluation and review. *[Relates to MSC Criterion 3.3]*
Score 75
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 fishery management procedures and outcomes The client can fulfill this condition by working cooperatively with other North Pacific fisheries that have been certified under the MSC program or are under going MSC Certification and are working with NMFS to address this condition.

12 MSC LOGO LICENSING RESPONSIBILITIES

As the "applicant" for certification of the Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery, Bering Select is the only entity that has the right to apply for a license to use the MSC logo. It is also the case that Bering Select has the right to approve the use of the logo for other fishers in the fishery at its discretion, as long as it abides by MSC directives.

13 CONCLUSION

The SCS Assessment team concluded after all aspects of the MSC procedures were followed, that the Bering Sea and Aleutian Islands Freezer/Longline Pacific cod fishery meets 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. Comments received did not change the scoring of the fishery.

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15. APPENDIX 1. PEER REVIEWS

Peer Reviewer Comments on the Draft Assessment Report for the Bering Sea and Aleutian Islands Freezer Longline Pacific Cod Fishery.

Peer Review #1.

Notes on Pacific cod document.

Some minor suggestions are in the document, using Word's review tool. Not so minor comments follow:

1. It might be useful to have species (or genera, at least) in the table of Fig. 6. Common names (particularly if abbreviated) may be misleading.

SCS-This is a published table that we are using and referencing. Therefore, we are not changing it.

2. What do you mean by "This stock meets the 80 guideline and moves towards the 100 guideline" (indicator 1.1.1.3). The stock meets the guideline, or rather the indicator meets the guideline?

SCS – Yes, the data on the indicator suggests that the score for the indicator, not the stock.

What do you mean by moves toward the 100 guideline? Does it mean that it is good, better than 85? If so, why not grade with 90, or 95? The phraseology appears strange.

SCS- reworded.

3. In indicator 1.1.1.4, it states that "The impact of environment is not understood, but the assessment authors have explored alternative fits to three time periods (1978-1988, 1988-2004, and all years) and different fits are consistent with these data". There are a couple of points here:

   a) What is the rationale for choosing those time periods? I assume that they go from the earliest year with data to the suggested new regime shift at the North Pacific and after that, but it is not clearly stated.

   b) What do you mean that the different fits are consistent with these data? Which data? Consistent on what?

   SCS – the time periods were chosen by the authors to look for trends and alternative explanations. The readers, if interested, can refer to the original text.

4. What does "Kalman" mean in Fig. 9 (Indicator 1.1.1.5)?

5. Table 2 (Indicator 1.1.4.3) may only be understood by the one who made it; there are no column names for second line of figures in each cell.

SCS – Just a formatting problem. Headers are present for each column.

6. When you quote as "personal communication" it is customary to state where the person is from (institution, enterprise, or whatever). For instance, (Janet Smoker, personal communication) in indicator 1.1.4.3. After going through the rest of the manuscript, there is a large number of such quotes. However, near the end of the document, quotes are adequately stated. Maybe, for the sake of brevity and clarity, an annex could be included that states the affiliation of such people contributing personal communications.

SCS Corrected.

7. For subcriterion 1.1.6, I am surprised to see forecasted values, from 2004 to 2017. Is the indicator not referring to past and present levels?

SCS- this is the analysis done by Thompson and Dorn that looks at present values and projections to see where the stock may be going. This is standard practice to try to determine how the stock is doing and what management measures may be needed.

8. Is there any convincing evidence that fishing mortality will not exceed reference points? The trajectory (Fig. 13) appears as heading directly to go over them any minute. The figure is somewhat unfortunate. The whole subcriterion 1.1.6 appears to be hanging from the clothesline. Maybe it is question of how it is written, but using forecasts and the historical trajectory may be questionable.

   Further, it is interesting that there is so much change in spawning biomass with so little change in fishing mortality.

9. In indicator 1.3.2 there is reference to a Power Point Presentation by Thompson. I would hope that there be better references to that (maybe a technical report, or something like that)

SCS Corrected.

10. On indicator 2.1.1.1 there is a paragraph: "These differences were reflected in the long term effects index of the EFH EIS (Figure 2.1) [not shown] which estimates the effect of longlines to be negligible in the EBS and GOA, and to have an effect index of 0.1% in the AI." Why not showing the figure, that apparently is relevant?

SCS Corrected.

11. In indicator 2.1.1.2, the last paragraph (highlighted) mostly repeats things that were already stated above.

12. Indicator 2.1.5.4: The paragraph includes "Hooks may also snag erect benthos such as gorgonians and coralline hydroids", that has already been said and strictly corresponds to other indicator.

SCS- not so. These invertebrates are sessile and form a structure that is used as habitat so it is pertinent here as well.

13. The conditions for indicators 2.1.3.2 and 2.1.5.4 are identical. Shouldn't there be a distinction between the two? It is supposed that each of the indicators refers to one specific issue, does it not?

SCS – The reason they are the same, is the only place the assessment team found a problem with understanding gear on habitat is from lost gear. The assessment team was minimally happy with knowledge about the effects of regular gear use.

14. Indicator 2.2.1.1 It says "Since 2000, using counts derived from comparable methodologies, the western population of Steller sea lions has increased by 12 percent [over what time period?]". I would assume that since 2000 and up to date.

SCS – yes.

15. I don't see any reference to identifying the likely effects of climate variation on populations or ecosystems. Is that whole issue not included any more?

SCS- it was included in general discussions under a variety of other indicators in an implicit, but not explicit manner.

16. In indicator 3.2.1.3 the explanatory paragraph is missing; referring the answer to a previous paragraph seems inappropriate.

SCS – taken care of.

17. In indicator 3.2.2.1, it is stated that "Following a series of above average year classes in the late 1970s and early 1980s, population abundance peaked in 1987 and has been declining since. Recent declines in population abundance are a consequence of average to below average recruitment over the past 15 years. During this period only the 1999 year-class was classified as above average abundance." The automatic question arising is why there has been below average recruitment over the past 15 years, particularly considering the strict application of precautionary rules?
I would believe that this has to do with environmental variability, but see no inclusion of this issue at all in the document.

SCS- this was covered under 1.1.1.4.

18. In Indicator 3.2.2.8 there is a highlighted phrase that requires attention.

SCS- Taken care of.

19. For Indicator 3.2.2.9 there is not explanatory paragraph. Is it not needed?

SCS Corrected.

20. Finally, climate fluctuations effects on fishery and ecosystem appear at Indicator 3.2.3.1, dealing with research. It seems odd, however, that there are no specific indicators on this subject, particularly at the north Pacific, one of the most extensively studied areas.

21. Indicator 3.2.5.1 still requires summary.

SCS – taken care of.

22. References are not in place.

SCS – Taken care of.

Peer Review #2.

a. The overall clarity of the report

In general, the report is well written, clear, and informative. As discussed below, however, the scores assigned to some performance indicators appear logically inconsistent with the written explanations and scoring guidelines.

b. Under Sections 1 through 6 and Sections 8 through 11 of the report, 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

In general, the information about the fishery and MSC assessment process is adequate. The major exception is the absence of an explanation of the apparent upward trend in the catch of several nontarget and "other" species, as shown in Figure 6.

SCS- Because this is covered under the evaluation, it is not necessary in the general overview in our opinion.

c. Under Section 7 of the report, 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.

The written text under each MSC Principle adequately describes the information reviewed. However, the scores assigned to the following performance indicators appear logically inconsistent with the written explanations and scoring guidelines:

Indicator 2.1.1.2 Information is available on the position and importance of the target species within the food web.

For this performance indicator the guidepost for a score of 100 is: Quantitative information is available on the position and importance of the target species within the food web at key life stages. The assigned score of 100 is inconsistent with the absence of a statement by the evaluation team that quantitative information is available on the relative importance of Pacific cod in the diet of various species, such as halibut, salmon shark, northern fur seals, Steller sea lions, harbor porpoises, various whale species, and tufted puffin.

SCS- This is covered in the PSEIS, the SAFE documents, and in the Ecosim modelling. We cannot put table sin of all of this information, so we cited the general documents and analyses where this information is embedded and analyzed.

Indicator 2.1.1.3 There is information on the potential for the ecosystem to recover from fishery related impacts.

For this performance indicator the guidepost for a score of 80 is: The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are understood, allowing reasonable assessment of recovery potential. The assigned score of 90 is inconsistent with the statement by the evaluation team that experimental evidence assessing the impact of longlines on benthic habitats, as well as information on the potential for recovery of those habitats, is lacking, and that the EFH-EIS found no studies that quantitatively assessed the impacts of longlines on seafloor habitat features.

SCS disagrees. Again, we cite the studies where this has been looked at in specific. We score the fishery relatively well on general understanding. The only place we found evidence significantly lacking was in the lost gear effects on habitat and biota.

2.1.2.3 There is information on any unobserved fishing mortality on target or other species (i.e. sources of mortality other than those above such as IUU fishing).

For this performance indicator the guidepost for a score of 80 is: Information from existing work has allowed qualitative estimates of unobserved fishing mortality to be made; Monitoring is occasional or sporadic. The assigned score of 80 is inconsistent with the statement by the evaluation team that it found it difficult to obtain information on the quantity of gear lost by the fishery, or on its potential ghost fishing. Part of the inconsistency may be related to the ambiguity created by including target and other species in the same indicator.

SCS acknowledges the difference between target and non-target. If lost gear, which is expected to be minimal is not known, nor its effects, this does not suggest a lack of knowledge on all fronts. The fishery knowledge is good in general. We deal with lost fishing gear and its effects in other sections.

2.1.3.1 There is adequate knowledge of the physical impacts on the habitat due to use of gear.

For this performance indicator the guidepost for a score of 80 is: Impacts of gear use on the habitat are identified including extent and location of use; Effects of habitat perturbations estimated and appear stable. The assigned score of 80 is inconsistent with the statement by the evaluation team that there is a lack of direct studies on the impacts of longlines on benthic habitat, and that more work on the impacts on habitat of longline gear is required before it can be said that physical impacts on the habitat due to use of gear have been studied and quantified.

SCS disagrees. The fact that there is good general knowledge of habitats and good general knowledge of longline gear and how it affects areas, allows a qualitative assessment at the very least. Again, lost gear and its effects are handled other places. It would be nice to get more, but there is a good deal of correlative information available.

Indicator 2.1.4.1 Levels of acceptable impact are determined and reviewed.

For this performance indicator the guidepost for a score of 80 is: Levels of acceptable impacts (e.g. biological reference points) for key aspects of the ecosystem within main fishing areas have been estimated and are regularly reviewed. The assigned score of 80 is inconsistent with the statement by the evaluation team that for some species that might be considered key in respect of this fishery impacts are not regularly reviewed and limits have not been set.

SCS modified the scored for the fishery below a full pass, and assigned a condition.

Indicator 2.1.5.3 The impacts on ecosystem structure and function from removal of non-target stocks are known.

For this performance indicator the guidepost for a score of 80 is: Some quantitative information is available on consequences of current levels of removal of non-target species; The available data suggest no unacceptable impacts of the fishery on ecological systems within major fishing areas. The assigned score of 85 is inconsistent with the statement by the evaluation team that species-level assessments have not been carried out for all affected species and assessments are lacking for some groups.

SCS disagrees. There is some quantitative info on a number of key species, just not for every single one. There is more known about the general Bering Sea ecosystem functions and species than almost anywhere in the world. There is more quantitative information than almost anywhere else in the world. Some things need to be improved or added, but there is a lot known.

Indicator 2.1.5.4 Fishery impacts on habitat structure are known.

For this performance indicator the guidepost for a score of 80 is: Impacts of the fishery on habitat structure within major fishing areas have been studied; There is no strong evidence of significant impacts. The assigned score of 75 is inconsistent with the statement by the evaluation team that most experts believe the impacts of the bottom longline gear on habitat are low, but the necessary studies to prove such assumptions have not been conducted in the BSAI. While the assigned score indicates that the level of information available on this issue falls short of the 80 guideline, the statement would suggest that closer to 60 would be more appropriate. The guidepost for a score of 60 is: Impacts of the fishery on habitat structure within major fishing areas are estimated, although the issue has not been directly studied.

SCS – Again, the score of 75 is based on the fact that there is a great deal of knowledge of BSAI habitat from multiple decades of studies. On top of that, there are numerous studies on the effects of longline gear on biota and habitat in general, and in the BSAI on biota in specific. The one thing missing has been the potential risks/effects from lost gear, and that is what we identified as needing some further input.

Indicator 2.1.5.5 The effects of the fishery on associated biological diversity and productivity are documented.

For this performance indicator the guidepost for a score of 80 is: Impacts of the fishery on biological diversity and productivity have been studied and are within estimated limits. The assigned score of 80 is inconsistent with the statement by the evaluation team that the most obvious problem with the current state of knowledge is the lack of analytical population models for the two most heavily impacted species, skates and fulmars.

SCS – There is so much known for the BSAI biota and habitat. Although skates and fulmars are less well known in terms of impacts, there are ongoing studies on fulmars to answer this question, and we have already identified it as a concern and required it as a condition. As far as skates, there are some studies underway as well.

Indicator 2.3.1.3 There is sufficient data and understanding of functional relationships to determine appropriate management measures which will allow recovery of depleted non-target populations.

For this performance indicator the guidepost for a score of 80 is: Recovery plans to rebuild depleted non-target species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts. The assigned score of 80 is inconsistent with the statement by the evaluation team that adoption of Tier 3 management is precautionary but without a species-specific assessment the effect of such management, including the relative distribution of fishing effort by species, it is not possible to be assured that even this precautionary approach will enable recovery of the most vulnerable species.

SCS – This indicator establishes the fact that incomplete data and knowledge is acceptable if the management measures are precautionary. Tier 3 is precautionary. The lack of knowing how precautionary it is to a number of species is of concern, but in our opinion would not cause the score to be lower than 80.

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 fishery.

No technical inaccuracies or inadequacies were found other than those previously noted.

Peer Review #3.

Page 11.
Including this statement [Vessels participating in the line fishery include small to medium-sized catcher vessels ranging up to about 23 m (75 feet) in length] is misleading. Very few if any non-processing longline vessel target Pacific cod. Longline Catcher Vessels (CVs) targeting sablefish and halibut do catch Pacific cod as incidental catch, and are required to keep all that are brought on board. Longline CVs have a separate allocation of PCOD in the BSAI.

Page 12.
This [Since the 2000s, the line fishery has been more than doubled the reported trawl catch.] is not correct. In 2004 Freezer longliners caught 97,000 mt while trawl CVs and CPs caught 82,000 mt.

See NOAA Fisheries catch statistics
http://www.fakr.noaa.gov/2004/car110_bsai_without_cdq.pdf

And Pacific cod allocations.
http://www.fakr.noaa.gov/sustainablefisheries/specs04/bsatable5.pdf

Page 12.
[all three gear types play] - You've only mentioned two gears—Pot boats took 15,000 mt in 2004.

Page 14.
[EBS Pacific cod longline fishery.] - What is the source of the data. It should be noted that Freezer longliners also target Sablefish. You need to be certain that sablefish target fishery catches are not included. It also possible that other incidental catches occur in the PCOD fishery. This table appears to focus on skate/sharks and "other species" but does not include incidental catches of rockfish, sablefish, atka mackerel, pollock, halibut, etc. This table may be considered misleading in that regard.

An additional tables with these other incidental catches might be found in early drafts made available to the public for the IRIU Reauthorization Report prepared by the Council. (Jon McCracken).

There is some additional incidental catch information in the Freezer Longliner Sector Profiles at
http://www.fakr.noaa.gov/npfmc/misc_pub/NorthernEconomics/Processing%20Sector%20Profiles.pdf

Page 19.
[Any processing of additional Pacific cod, other than that landed directly by a vessel, is automatically recorded.] - This sentence does not make sense, and is questionable. Delete.

Page 26.
[individuals and organizations that agree with the management of a fishery simply do not believe they have the need to make this known during the assessment process as the client for the fishery assessment is already advocating for the fishery.] --
This statement appears relatively subjective and not necessarily science based.

Page 30.
[no other gadoids in significant quantities] -- The PCOD Target fishery catches averages well over 2,000 mt of pollock (a member of the gadidae family) every year. While pollock and Pacific cod are easily distinguished from one another this statement may be a bit strong.

It may be useful to review the Freezer Longline Sector Profile at
http://www.fakr.noaa.gov/npfmc/misc_pub/NorthernEconomics/Processing%20Sector%20Profiles.pdf

Page 37.
[**Score 95**] -- This score might be high given that logbook data is not entered into databased by NMFS.

While the logbook data is required and is reported, NOAA Fisheries does not systematically enter logbook data into electronic databases, and therefore the logbook data is not generally available for scientific uses.

Page 38.
[Additionally, fishing effort and catch information is collected by federal observers onboard the vessels.] -- There are two primary sources of information on catches by Freezer Longliners that are used by NOAA Fisheries—observer reports and weekly processing reports submitted by all processors. The combination of he two sources form the basis for catch estimates.

[primary industry sector in the BSAI Pacific cod fishery.] -- In 2004, the FLL caught 49% of the BSAI PCOD catch.
(http://www.fakr.noaa.gov/2004/car110_bsai_without_cdq.pdf)

While it is the largest single sector, it cannot be legitimately called the primary sector.

Page 39.
[**Score 90**] -- For other criteria, the term fishery was implicitly the freezer longliner Pacific cod fishery. In this criterion the assessment appears to look at all gears. I'm wondering if this is an issue. Should the scoring always be only on the FLL fishery or should fisheries with other gears be included.

Page 41.
[The 70% of catcher boat fishing] -- Trawl CVs catch over 20% of the PCOD in the BSAI, and a relatively high percentage of these are less than 125 ft and have limited observer coverage.

Virtually none of the jig fleet is observe red.

Page 46.
[observer reports.] -- In addition FLLs are required to report all catches and processed product to NOAA on a weekly basis.

Page 47.
[TAC.] -- Note that this is the TAC for all gears, not just the PCOD apportionment.

Page 66.
[Regulation (50 CFR part 679.5)] -- Other NMFS reporting regulations require the all CPs report catch, discards and processing amounts on a weekly basis, regardless of observer coverage.

Page 67.
[Groundfish"] -- The reg's require CPs report catches and discards of "Other Groundfish" which comprise several groundfish species as defined in the . FMP. There are no requirements for CPs to report catches of other non-specified species. These include most invertebrates, corals, starfish, sponges, etc. The distinction between "other groundfish" and non-specified catches is important to keep in mind. The only information on non-specified species catches comes from observer reports.

Page 69.
[We] -- Lost gear is required to be reported in log books. It would be possible with funding to do a random sample study of logbooks to determine the likelihood of lost gears and even determine locations of lost gears. You might consider this type of study a "condition"

Page 72.
[Condition] -- There are boxes and boxes of logbook data that could be analyzed for lost gear effects.

Page 73.
[Only sharks, skates and sculpins benefit from a specific assessment] -- The "other groundfish" category is defined in the FMP. Gradually the management regime is becoming more and more specific, and species are being removed form this catch-all category. Still there are lots of other species that are not included in the "other groundfish' group.

Page 86.
[AFSC(?)] -- I'm not sure why the question mark, but the AFSC is the Alaska Fisheries Science Center.

[Thus measurement] – awkward

Page 93.

[Pacific cod stock] -- The focus here should be more clearly on the effects of the PCOD fishery on other species that may be depleted. Starting out with this sentence is disruptive.

Page 96.
[Although] -- I think you should point out that the Council has not had to deal with depleted target species because of their relatively cautious management approach. They do have systems in place that can inform them of species that may be approaching a depleted status, and they appear to have the will to deal with these issues.

Page 102.
[pollock] -- PCOD?

Page 103.
[derby fishery] -- While there is a derby fishery, it is a derby of snails. The FLL fishery is open 8 months per year and vessel owner are able to take a longer perspective. There is a very limited number of vessels that can enter the fishery and no vessel longer than 125 ft can get any longer under the license limitation regulations. If the fleet was feeling that it was way overcapitalized. Then it is very likely that they would be pushing much harder to rationalize.

Page 107.
[limited entry fishery since 1995] -- While the license limitation program was approved by the NPFMC in 1995 it was not implemented until 1998 or 1999. Amendments approved in 1998 were not implemented until 2000 or 2001. The LLP created a closed class of vessels that could operate as FLL.

[overcapitalization.] -- In my opinion it is very difficult to call this fishery overcapitalized. It last 8 months. If it is overcapitalized it is the least overcapitalized fishery around.

[least-impacting gears – longlines] -- Subjective statement in light of other discussions.

Page 125.
[retain bycatch] -- This is an oxymoron. Bycatch is defined in MSA as discarded fish.

Page 130.
[The Council/NMFS system has had little experience with rebuilding overfished groundfish stocks, largely because no overfishing occurred during the Council's tenure. No Alaska Region groundfish stocks are currently considered overfished (http://www.nmfs.noaa.gov/sfa/reports.htm).] -- This should be mentioned in other discussions of overfished or depleted stocks and systems that deal with them.

Page 131.
[processor weekly production report data,] -- This is a key data set and needs to be mentioned with other fishery data set in other earlier discussions.

Page 136.

[As described in Section 3.2.3.1] -- This section should discuss funding for research provided by the Marine Conservation Alliance. Talk to Trevor McCabe.

Page 142.
[This indicator is about a systematic approach to internal reviews] -- This section could discuss the PSEIS, which is envisioned as a living document that will regularly be updated. Talk to Steve Davis at NMFS.