Pacific Hake (*Merluccius productus*)
Mid-Water Trawl Fishery

US (WOC) Pacific EEZ and Canadian Pacific EEZ Waters

PUBLIC CERTIFICATION REPORT

Contract Number: 07-03 Pacific hake
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Certificate No.:

Date: October 12, 2009

Clients: **Pacific Whiting Conservation Cooperative**
Association of Pacific Hake Fishermen
Oregon Trawl Commission

MSC reference standards:

MSC Principles and Criteria for Sustainable Fishing, Nov, 2004.
MSC Accreditation Manual Issue 4,
MSC Fisheries Certification Methodology (FCM) Version 6,
MSC TAB Directives (All)
MSC Chain of Custody Certification Methodology (CoC CM) Version 6.

Accredited Certification Body:
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Amendments Issued Since Original Draft

Version	Date	Amendment Description
1 Client Review Draft	December 22, 2008	First Draft
2 Peer Review Draft	February 16, 2009	Client comment edits
3 Public Draft Report	March 30, 2009	Peer review edits
4 Final Report	May 15, 2009	Stakeholder and CDC comment edits
5 Public Certification Report	October 12, 2009	Public Certification Report

1. INTRODUCTION

The Marine Stewardship Council (MSC) is a non-profit organization whose mandate is the long-term protection of the world's marine fisheries and the associated ecological components. Through a process of consultation with various stakeholders over a two-year period commencing in 1996, the MSC established its standard for well managed and sustainable fisheries called the "MSC Principles and Criteria for Sustainable Fishing" (MSC P&Cs).

The finalized 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. The fisheries certification methodology (FCM) has since been updated periodically with the current version (FCMv6) issued in September 2006.

The objective of the MSC is to promote fisheries certified as sustainable directly in the marketplace through the use of the MSC Fish-tick eco-label on certified fish products. Ultimately, through educating fish product consumers about the plight of fishing stocks in the world and the MSC Program, it is hoped they will reward sustainable fisheries by choosing those fish products originating from certified sustainable fisheries.

Interested fisheries can submit their candidature to an accredited certification body for comparison against the MSC P&Cs. The comparison is a three part process inclusive of a pre-assessment (data gap analysis of the fishery), a full assessment (measurement of the fishery against the MSC P&Cs) and certification (5 year validity with annual surveillance requirements) for those fisheries that meet the standard. Successfully certified fisheries can claim their fishery is well managed and sustainable through the use of the MSC Fish-tick eco-label on product and marketing materials.

1.1 Unit of Certification

The MSC certification methodology defines a candidate fishery unit of certification as follows "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock) and management framework."

The candidate fishery has two units of certification which are defined below. Successful certification of either or both units will result in award of a certificate for each specific unit of certification:

Unit of Certification 1: US Whiting Fishery – All Sectors

Species:	Pacific Hake/Whiting (*Merluccius productus*)
Geographic Area:	US (WOC) Pacific EEZ Waters
Method of Capture:	Mid-water Trawl
Fleet:	All US Pacific Hake harvesting sectors, including motherships, catcher/processors, shore-side catchers, and the Makah tribal fishery.

Stock: This certification assesses the offshore stock of Pacific hake/whiting, and does not include inshore coastal stocks native to Puget Sound or Strait of Georgia. The offshore stock undertakes extensive annual migrations between southern spawning grounds off the southern coast of California, and northern feeding grounds that have extended as far as Alaska in recent years. This assessment considers the health of the offshore stock and the effect of the harvest on that stock, across the range of migration.

Management: The US component of the fishery is managed by the Pacific Fishery Management Council. The US Regulatory Authority for the fishery is the National Marine Fisheries Service, Northwest Region. The Makah fishery is managed by the tribe and is managed in accordance with the harvest control rules established by the NMFS.

Traceability within Fishery: All transfers to motherships from catcher vessels are monitored and recorded by at-sea observers. In the at-sea catcher/ processor fleet, the vessels carry NMFS observers that sample all hauls brought on deck. Catch is weighed by flow scales on board and verified by at-sea observers. All shoreside landings are monitored by the Shoreside Hake Observation Program and are recorded by processing plant employees on fish tickets which are in turn reported to the Oregon Department of Fish and Wildlife. The Makah fishery delivers to both the mothership sector and occasionally into a shoreside processing plant. The Makah fishery is subject to the same reporting requirements as the other US fisheries.

At-Sea Processing: 24% of the US Pacific hake Acceptable Biological Catch is allocated to the at-sea (mothership) processing sector of approximately 3 to 6 mothership processing vessels and 15 to 25 harvesting vessels. 34% of the US hake ABC is allocated to the catcher/ processor sector of 6 to 10 vessels.

Point of Landing: Shoreside landings of product must occur at designated ports which allow Federal and State compliance and enforcement officers to observe and verify landings.

Unit of Certification 2: Canadian Hake Fishery – All Sectors

Species: Pacific Hake/Whiting (*Merluccius productus*)

Geographic Area: Canadian Pacific EEZ Waters

Method of Capture: Mid-water Trawl

Fleet: Mid-water trawl vessels represented by the Association of Pacific Hake Fishermen

Stock: This certification assesses the offshore stock of Pacific hake/whiting, and does not include inshore coastal stocks. The offshore stock undertakes extensive annual migrations between

	southern spawning grounds off the southern coast of California, and northern feeding grounds that have extended as far as Alaska in recent years. This assessment considers the health of the offshore stocks and the effects of the harvest on those stocks, across the range of migration.
Management:	The fishery is managed by Fisheries and Oceans Canada. The Canadian share of 26.12% of the Total Allowable Catch is calculated using combined US/ Canada assessment conducted by the Northwest Fisheries Science Center.
Traceability within Fishery:	All shoreside landings are required to be verified by independent dockside monitoring contractors who confirm quantity of product offloaded and verify completion of required fishing logs which includes location where Pacific hake was harvested.
At-Sea Processing:	At-sea processing is conducted by foreign Joint Venture fleets which are contracted in years when available hake resource surpasses on-shore processing capacity or other extenuating circumstances occur.
Point of Landing:	Product must be landed at a DFO authorized wharf facility which is accessible to DFO Compliance and Enforcement Officers and independent dockside observers.

1.1.1 Point of Entry in Chain of Custody and Eligibility

The specific scope of this full certification assessment is the offshore commercial mid-water trawl Pacific hake fishery conducted by permitted harvesters within the US (WOC) and Canadian Pacific EEZ waters. That product is landed either in ports in British Columbia, Washington, Oregon and California directly at certification client processing facilities or transferred to at-sea processing vessels (motherships (US) or Joint-Venture vessels (Canada).

Integrity of the landings for MSC Chain of Custody requirements was only checked to the point of first landing for Pacific hake, for both land-based processing facilities or at sea motherships/ joint-venture vessels, landed by legally permitted, Pacific hake fishing vessels with valid Pacific hake fishing permits or licenses where the landings can be monitored in accordance with monitoring requirements.

As required by MSC Policy Advisory 4, TAVEL Certification and the Pacific hake certification clients have agreed that the eligibility date for this certification is October 1, 2008, (six months prior to the April 1, 2009 date of publication of the Public Draft report). All client companies wishing to sell certified product must have a valid Chain of Custody certification prior to the back dating of product eligibility and labeling of product as MSC certified.

1.2 The Clients

The clients for this certification are the Pacific Whiting Conservation Cooperative (PWCC), the Association of Pacific Hake Fishermen (APHF) and the Oregon Trawl Commission (OTC).

The Pacific Whiting Conservation Cooperative (PWCC) is comprised of three member companies, American Seafoods, Glacier Fish Co., and Trident Seafood. These companies operate 10 vessels licensed to participate in the catcher processor sector of the US west coast Pacific hake fishery. The PWCC formed in 1997 to promote the rational harvest, optimal utilization and minimal waste in the hake fishery. The PWCC have worked cooperatively with member companies to greatly improve product recovery rates and decrease bycatch. In addition PWCC funds and performs research to generally improve the west coast groundfish fishery.

The Association of Pacific Hake Fishermen represents member harvesters from the Canadian fleet which consists of approximately 28 catcher vessels.

The Oregon Trawl Commission is an Oregon state government agency which operates under the umbrella mandate of the Oregon Department of Agriculture Commodity Commissions Program. Formed in 1962 the mission of the OTC is to enhance the image of the trawl industry and to increase opportunities, industry wide for a sustainable and profitable industry, through promotion, education, research, and by initiating, tracking and commenting on legislation and regulations. The OTC is comprised of eight commissioners, five fishermen, one processor, one distributor and one public member. The OTC represents 29-37 catcher vessels and shoreside based processing companies.

1.3 Summary

The Pacific hake is also known as the Pacific whiting, this document will refer to the species as Pacific hake.

The certification process and this report has considered stock status and fishery management practices to the end of the 2007 fishing season and includes information updated until December 2007.

The Canada and US commercial Pacific hake fisheries entered the pre-assessment process of the MSC in the July 2006, the pre-assessment was completed in October 2006. The full assessment of the candidate fishery was started in May 2007. There were no site visits conducted as part of the pre-assessment, rather the meetings to further understand the fishery, its management and relevant scientific work were conducted by teleconference calls. The assessment team met in August 2007 to draft performance indicators. The official fishery visit was conducted in July 2008, with meetings taking place in Vancouver, BC and Seattle, WA. The assessment was conducted using the MSC Principles and Criteria for Sustainable Fishing, Issue 2, November 2002. The MSC Fisheries Certification Methodology (FCM) Version 6, September 2006 was used for all steps of the assessment process.

Within the Pacific hake fishery state, federal and provincial agencies all have defined roles, responsibilities and authority for fishery management. Trans-boundary issues, such as

research, stock assessment and total allowable catch (TAC) or Acceptable Biological Catch (ABC) setting, are addressed as per the provisions established in the *Agreement Between the Government of Canada and the Government of the United States of America on Pacific Hake/Whiting (*Canada/US Hake/Whiting Agreement) signed in 2003 by the two federal governments and ratified in 2007. Although the Agreement is ratified, there are currently administrative hold-ups in the US federal system which is preventing the full implementation of the Agreement. However, the parties implemented the spirit of the Agreement in 2004. Since then, the US and Canada have acted under the accords of the agreement in good faith by conducting joint assessments, setting and dividing ABCs (Bush 2003).

In the US, the National Marine Fisheries Service (NMFS) is the ultimate authority for management of the hake fishery off the coast of Washington, Oregon, and California (NMFS 2007). The state agencies of Washington, Oregon and California regulate fishery landings, processing, and the shoreside hake industry through rules and statutes which are consistent with federal rules and guidelines. Fisheries management functions for the hake fishery in the US are described in the Pacific Coast Groundfish Management Plan and annual federal fishery specifications documents and the Code of Federal Register (NMFS 2007).

In Canada, Fisheries and Oceans Canada (DFO) is the sole regulatory agency responsible for management of the hake fishery on Canada's Pacific coast. With a single regulatory agency charged with managing the fishery within Canada, the roles and responsibilities are clear-cut.

Management functions for the BC groundfish fishery are detailed in the *Groundfish Integrated Fisheries Management Plan* (IFMP) (DFO 2008). The groundfish trawl portion of groundfish management is described in Appendix 8 of the IFMP (*Groundfish Trawl Commercial Harvest Plan*). The *Pacific Offshore Hake Harvest Plan* is an addendum to the annual IFMP for groundfish.

The Province of British Columbia has a regulatory role with respect to on-shore processing, and acts in an advisory capacity to DFO in the fishery management process. There is no ambiguity in roles and responsibilities in management of hake within the Canadian fishery.

The Assessment Team consisted of three expert assessor members and one lead auditor to provide guidance on the certification methodology as required by the MSC FCM. The team members were, in order of MSC Principle, Dr. Max Stocker, PhD., Dr. Jeremy Collie and Mr. Mark Pedersen, M.Sc. The Lead Auditor for TAVEL Certification was Mr. Steven Devitt, B.Sc.

The Assessment Team drafted sub-criteria groupings, performance indicators and scoring guideposts which were used to evaluate the performance of the fisheries' conformance to the MSC Principles and Criteria for Sustainable Fishing. Through the prescribed process of public comment, the performance indicators and scoring guidelines (PISGs) were finalized based on comments by the client, the MSC and stakeholders. Stakeholders were contacted personally and/or through the electronic media, and were given the opportunity to make written and oral submissions.

After consideration of all objective evidence presented, the assessment team recommends that the fishery be certified with conditions.

1.4 Strengths and Weaknesses of Client Operation

Strengths

There are clearly defined relationships between all principle stakeholders in the fishery including the harvesting sector, fishery scientists and managers. These relationships appear to be functioning efficiently.

The stock assessment process is clearly defined, rigorous and covers the range of the stock under assessment. The stock assessment process incorporates data collected from both fishery independent and dependent sources. Stock assessments are reviewed through a formalized peer review process which incorporates opportunities for both scientific and industry feedback. The allocation process between Canada and the US was established in 2003 and both parties respect the allocations which were established in the Canada/ US Hake/Whiting Agreement.

There is a clear system of harvest management with appropriate harvest control rules and tools implemented. Compliance in both US and Canadian fleets is generally high. Since 2003, the Pacific Fishery Management Council (PFMC) has consistently set Allowable Biological Catches at lower levels than the defined Optimum Yield calculated in the stock assessment process and as such, has demonstrated pre-cautionary behaviour which provides for a safety margin concurrent with the level of risk resulting from uncertainty in the stock assessment.

Weaknesses

Methodological differences in stock assessment techniques have led to divergent opinions in the stock assessment community regarding the stock assessment method and results. The hydroacoustic survey methodology used in estimating the population biomass has been questioned as to its effectiveness to accurately detect and quantify juvenile hake. As such, prediction of incoming recruitment has been a source of uncertainty in determination of stock health.

The management strategy needs evaluation to test the performance of the 40:10 rule applied to manage hake, a species with high recruitment variability and uncertain reference points.

As with most fisheries, impact of removals of the target species, hake, from the California Current Ecosystem is not currently well understood. Impacts of the fishery on other ecosystem components remain a source of uncertainty requiring additional analysis.

1.5 Conditions and Recommendations

Conditions, condition intents and suggestions provided by the team can be seen in Section 10 below. Currently, there are 15 conditions which the client addressed through an action plan

which was approved by the assessment team and TAVEL Certification.

Some conditions will require the cooperation of the scientific and management agencies in both jurisdictions. In the instance that the client requested assistance from the agencies to conduct specific condition tasks, TAVEL formally confirmed that those agencies are prepared to assist with those action undertakings.

2.0 BACKGROUND TO THE REPORT

2.1 Authors and Peer Reviews.

The assessment team consisted of the following four individuals.

Dr. Max Stocker, Ph.D. – Dr. Stocker has 28 years of extensive experience in fisheries science. He is currently a part time marine fisheries consultant under contract with Fisheries and Oceans Canada (DFO) to provide scientific advice on highly migratory species in the Pacific Ocean. He is the lead Canadian scientist for highly migratory species for the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC). He serves as co-chair of the Stock Assessment Working Group of the Scientific Committee of the WCPFC and chairs the ISC Albacore Working Group. From 1978-2006, Dr. Stocker held the position of research scientist with DFO at the Pacific Biological Station conducting population dynamic studies, conducting peer reviewed stock assessments of many marine species, and communicating results to fisheries managers and stakeholders.

Dr. Jeremy Collie, Ph.D. – Dr. Collie is Professor of Oceanography at the Graduate School of Oceanography, University of Rhode Island. He is a quantitative ecologist who specializes in fish population dynamics. He also studies the impacts of disturbance on benthic communities, predator-prey interactions, stock assessment and fisheries management.

Mr. Mark Pedersen, M.Sc. – A Senior Marine Fisheries Scientist and President of Margenex International, founded in 1992. He was a groundfish biologist and fisheries manager with Washington Department of Fisheries from 1973 through 1991, the last 6 years, as Assistant Director. Mr. Pedersen has extensive experience in marine environmental issues; biology and habitats of economically important marine fishes, including Pacific hake (whiting), fishery management policy and regulations; seafood business and statistics for Pacific Northwest fisheries; Alaska offshore fisheries and Pacific Fishery Management Council issues. He has directed, managed, and/or participated in numerous projects involving fish migrations, resource stock assessments, fishery characterization, marine habitat impact assessment, enhancement, and mitigation. His work also involves assessment of environmental impacts, the Endangered Species Act, and planning and design of natural resource related projects.

Lead Auditor – Certification Process

Mr. Steven Devitt, B.Sc. – Operations Manager and Lead Auditor for TAVEL Certification

Inc since 2000. His principle responsibilities include management of the project, verification of proper MSC Fisheries Certification Methodology (FCM) procedural implementation during the full assessment, preparation of report and client contact. Mr. Devitt brings a broad environmental and fisheries background to the project, he is a trained ISO 14000 lead auditor. He also has a strong working knowledge of anthropogenic causes of disturbance to coastal zones.

Peer Reviewers

As required by MSC Fisheries Certification Methodology, version 6, the client reviewed report must be peer reviewed by two individuals. The peer reviewers for this report are as follows:

Mr. Tom Jagielo, M. Sc. – Mr. Tom Jagielo is recently retired from Washington Department of Fisheries and Wildlife (WDFW) where he completed his career as a Senior Research Scientist. Mr. Jagielo completed a B. Sc. degree in biology with marine science emphasis at Penn State in 1977 and an M. Sc. degree in Fisheries in 1984 while working as a staff biologist on limnology and biological oceanography projects for the University of WA. He spent his 24 year career with WDFW specializing in groundfish stock assessment, adapting state of the art tools and methods to the task of assessing marine fish populations for sustainable fisheries management. Mr. Jagielo has produced numerous stock assessments used by the Pacific Fishery Management Council (PFMC), including analysis of lingcod, black rockfish, and yelloweye rockfish populations. His early assessment of West Coast lingcod identified the stock as overfished, and his rebuilding analysis adopted by PFMC ultimately resulted in a rebuilt population within the established 10 year time frame. Tom served on the PFMC Scientific and Statistical Committee (SSC) and the US-Canada Groundfish Technical Subcommittee (TSC) for over 15 years.

Dr. Gil Sylvia – Dr. Gil Sylvia is a Marine Resource Economist, Superintendent of the Coastal Oregon Marine Experiment Station (COMES) and Professor in the Department of Agriculture and Resource Economics, Oregon State University. Dr. Sylvia has a Master's Degree in Fisheries and Wildlife Biology from Colorado State University (1983) and a Ph.D. in Marine Resource Economics from the University of Rhode Island (1989). His research focuses on fishery and aquaculture management and policy, seafood marketing, and bioeconomic modeling. Gil has published in numerous economic and fishery management journals and consulted in a variety of national and international fishery and aquaculture projects. He recently served on a committee of the National Research Council for improving collaborative fishery research, and presently serves on a committee developing Sea Grant's national fishery and seafood strategic implementation plan. As Superintendent of COMES, the largest applied marine research group in Oregon, he has worked in close collaboration with the fishing/seafood industry, coastal communities, and management agencies to increase benefits from utilizing and sustaining West Coast marine resources. COMES signature programs include the Pacific Whiting Project, Molluskan Broodstock Program, Community Seafood Initiative, Surimi Technology School, Astoria Seafood Laboratory, Salmon Ecology Initiative, and Project CROOS (Collaborative Research on Oregon Ocean Salmon).

2.2 Previous Assessments

This is the first full assessment of conformity of the Canada and US commercial Pacific hake mid-water trawl fishery to the MSC Principles and Criteria for Sustainable Fishing.

2.3 Field Inspections

While field visits to the fishery were not conducted during the course of the pre-assessment, site visits were conducted during the full assessment. In the absence of a site visit during the pre-assessment, meetings were conducted via teleconference. Interviews were conducted with the clients, US and Canadian federal government representatives, monitoring companies, members of the harvesting and processing sector, and indirect stakeholders.

The first assessment team meeting was conducted in August 2007. The assessment team members met in Toronto, Ontario to review the certification assessment process; current fishery context; and to draft the performance indicators for the fishery.

The fishery assessment visit was conducted during the period of July 6-11, 2008 with meetings held in Vancouver, British Columbia; and Seattle, Washington. These meetings included discussions with members of the client group, individual processors, stock assessment biologists, resource management staff, Pacific Fishery Management Council (PFMC) representatives, Oregon Department of Fish and Wildlife (ODFW), and Fisheries and Oceans Canada (DFO) and National Marine Fisheries Service (NMFS) scientific and management staff.

2.4 Consultations

During the full certification assessment TAVEL received written feedback and personnel communications from the ENGOs Oceana and Pew Charitable Trusts. Electronic and teleconference discussions were also conducted with members of the NGO community including the Natural Resource Defense Fund.

Two groups of stakeholders provided input during the consultation process. The first group included those who were specifically invited by the assessment team with the objective of attaining specific information about the fishery and its management. This group included the client and their contractor hired to prepare the PISG response submission, NMFS, PFMC and DFO personnel.

The second group included those parties whose information was not specifically requested by the assessment team but who choose to present information about the fishery, the stock health science, fishery impacts and the fishery management system. This group of stakeholders would generally include all other parties who have a concern about some aspect of the fishery and its management. The main topics discussed were the stock assessment process and concerns about calculations of stock biomass; management of the fishery at harvest levels near

the defined reference points; the potential impacts of removal of Pacific hake on ecosystem components including other fish and mammals; and the impact of the fishery on non-target species populations such as Chinook salmon and depleted rockfish species.

The agenda for the fishery assessment visit is displayed in Table 1.

Table 1: Finalized Agenda for Pacific Hake Fishery Certification Assessment Visit, July 6-12, 2008

Date/ Location	Individuals/ Affiliation	Discussion Topics
July 6, 2008 Vancouver, BC	▪ Max Stocker ▪ Jeremy Collie ▪ Mark Pedersen ▪ Steven Devitt	Briefing and PI&SG Weighting Session
July 7, 2008 Vancouver, BC	▪ Diana Dobson, DFO ▪ Gary Logan/Barry Ackerman, DFO Resource Management ▪ Alan Sinclair, DFO Science ▪ Shannon Mann, APHF ▪ Steve Martell, UBC	▪ General Questions ▪ P3 – Canadian Fishery Management ▪ P1 – Stock Assessment ▪ Client Representative ▪ P1 (Stock Assessment)
July 8, 2008 Seattle, WA	▪ John DeVore, PFMC ▪ Dayna Matthews, NOAA ▪ Dan Waldec, PWCC ▪ Steve Williams, ODFW	▪ P3 ▪ P3 –Enforcement ▪ Client Perspective ▪ P3 - Shoreside
July 9, 2008 Seattle, WA	▪ Tom Helser, NMFS ▪ Martin Dorn, NMFS/ SSC Groundfish Sub Panel ▪ Steve Freese, NMFS ▪ Steve Joner, Makah Tribe	▪ P1 – Stock Assessment ▪ P1 – SA Review Process ▪ P1 & P3 – Hake Program ▪ Makah Tribal Fishery
July 10, 2008 Seattle, WA	▪ Phil Levin, NMFS ▪ Elizabeth Clarke, NMFS ▪ Vanessa Tuttle, NMFS ▪ Karen Garrison, NRDC	▪ P2 – Ecosystem ▪ Fisheries Science Program ▪ WCGOP ▪ Stakeholder
July 10 – PM July 11 Seattle, WA	▪ Max Stocker ▪ Jeremy Collie ▪ Mark Pedersen ▪ Steven Devitt	▪ Initial Scoring Discussion – Assessment Team Only

3.0 FISHERY BACKGROUND INFORMATION

3.1 The Target Species

The following section is taken from pages in Appendix B, Part 2 Groundfish Life History Descriptions, of the Pacific Coast Groundfish Fishery Management Plan for the California, Oregon and Washington Groundfish Fishery, released in draft form by the Pacific Fishery Management Council in 2006 (PFMC, 2005).

Distribution

The coastal stock of Pacific hake is migratory and inhabits the continental slope and shelf within the California current system from Baja California to Southeast Alaska (Quirollo 1992, Mechlenburg *et al*. 2002). All life stages are found in euhaline waters at 9–15 ^{o}C (NOAA 1990). Adults are epi-mesopelagic (Bailey *et al*. 1982, NOAA 1990, Sumida and Moser 1980). In survey data, adults most frequently occur between 100 and 150 m, with nearly all taken at depths of 50–400 m (Allen and Smith 1988).

Life History

Eggs of the Pacific hake are neritic and float to neutral buoyancy (Bailey 1981, Bailey *et al*. 1982, NOAA 1990). Eggs and larvae of the coastal stock are pelagic in 40–140 m of water (Smith 1995). Moser *et al*. (1997) investigated the abundance and distribution of Pacific hake eggs at sites off central and southern California, and reported that most of the eggs were at depths of 50–150 m. They also reported that the early-stage eggs were deeper (75–150 m) in the water column compared to the depth (50–100 m) of later-stage eggs. Larvae tend to aggregate near the base of the thermocline or mixed layer (Stauffer 1985). Horne and Smith (1997) analyzed CalCOFI data on the abundance and distribution of Pacific hake larvae from sites off central and southern California for 1955–1984, and reported that the biomass of Pacific hake larvae is strongly influenced by mortality and drift with prevailing currents. They reported that the location of spawning largely determined the survival of the larvae, with higher survival occurring in warm years (when spawning adults moved northward) compared to cold years (when spawning adults moved southward). Sakuma and Ralston (1995) conducted similar studies off the coast of central California and found that larvae accumulated in warmer nearshore waters (approximately 100 m).

Juveniles reside in shallow coastal waters, bays, and inland seas (Bailey 1981, Bailey *et al*. 1982, Dark 1975, Dark and Wilkins 1994, Dorn 1995, NOAA 1990, Sakuma and Ralston 1995, Smith 1995), and move to deeper water as they get older (NOAA 1990). Sakuma and Ralston (1997) reported that juveniles are less abundant in upwelled nearshore coastal waters compared to non-upwelled water. The importance to juveniles of submarine canyons in southern California with high levels of organic enrichment by macrophyte detritus was evaluated by Vetter and Dayton (1999). They compared these canyons to flat areas, and reported that the canyons had much higher megafauna abundance and species richness, and the relative abundance of juvenile Pacific hake was hundreds of times higher in the canyons at depths of 150–200 m. Overall, highest densities of Pacific hake are usually between 50 and

500 m, but adults occur as deep as 920 m and as far offshore as 400 km (Bailey 1982, Bailey *et al*. 1982, Dark and Wilkins 1994, Dorn 1995, Hart 1973, NOAA 1990, Stauffer 1985). Spawning is greatest at depths between 130 and 500 m (Bailey *et al*. 1982, NOAA 1990, Smith 1995).

Reproduction

The coastal stock of Pacific hake spawns from December through March, peaking in late January (Smith 1995). In the Strait of Georgia, spawning occurs from March through May and peaks in late April (Beamish and McFarlane 1986, Shaw *et al*. 1990). In Puget Sound, spawning occurs primarily during February through April, peaking in March (W. Palsson). Spawning aggregations begin to form up to a month before actual spawning. Pacific hake may spawn more than once per season, so absolute fecundity is difficult to ascertain. Coastal stocks have 180–232 eggs/gram body weight, but Puget Sound and Strait of Georgia stocks have only 50–165 eggs/gram body weight (Mason 1986). Bailey (1982) estimated that a 28-cm female had 39,000 eggs, while a 60-cm female had 496,000 eggs.

Eggs are spherical and 1.14–1.26 mm in diameter with a single oil droplet (Bailey *et al*.1982). Embryonic development is indirect and external (NOAA 1990). Hatching occurs in 5–6 days at 9–10^{o}C and 4–5 days at 11–13^{o}C (Bailey 1982, Hollowed 1992). Larvae hatch at 2–3 mm total length (Stauffer 1985, Sumida and Moser 1980) with a yolk sac that is gone in 5–7 days (Bailey 1982). Larvae metamorphose into juveniles at 35 mm, typically in 3–4 months (Hollowed 1992). Juveniles range from 35 mm to 40 cm depending on gender (Bailey *et al*. 1982, Beamish and McFarlane 1986, Hollowed 1992).

Mortality

Eggs and larvae of Pacific hake are eaten by pollock, herring, invertebrates, and sometimes Pacific hake. Juveniles are eaten by lingcod, Pacific cod, and rockfish species. Adults are preyed on by sablefish, albacore, pollock, Pacific cod, soupfin sharks, and spiny dogfish (Fiscus 1979, McFarlane and Beamish 1986b, NOAA 1990). Another important group of predators of adult Pacific hake are marine mammals, including the northern elephant seal (*Mirounga angustirostris*), northern fur seal (*Callorhinus usrsinus*), California sea lion (*Zalophus californianus*), and several species of dolphins and whales (Methot and Dorn 1995).

Behaviour

All life stages feed near the surface late at night and early in the morning (Sumida and Moser 1984). Larvae eat calanoid copepods, as well as their eggs and nauplii (McFarlane and Beamish 1986b, Sumida and Moser 1984). Juveniles and small adults feed chiefly on euphausiids (Tanasichuck 1999, NOAA 1990). Large adults also eat amphipods, ocean shrimp, squid, herring, smelt, crabs, sometimes juvenile Pacific hake, and pelagic schooling fish (e.g., eulachon and herring) (Gotshall 1969, Bailey 1982, Dark and Wilkins 1994, McFarlane and Beamish 1986b, NOAA 1990, Livingston and Bailey 1985). Buckley and Livingston (1997) reported the results of stomach content analyses of Pacific hake collected from 1989 to 1992 along the west coast of the U.S., from southern California to Vancouver Island. They found that diet varied with latitude and season. In general, in all areas the diet

was dominated by fishes, but euphausiids were also consistently found in the diets of Pacific hake from all areas. Clupeidae (primarily Pacific herring) were dominant prey in fish from sites off of Vancouver Island, Washington, and Oregon, whereas northern anchovy and rockfish dominated the diets in central and southern California, respectively. In areas where a broad range of sizes of Pacific hake were found, considerable cannibalism was observed among fish larger than 40 cm fork length, with a frequency of occurrence of 39%. Some of the major seasonal differences in diet for Pacific hake from sites off of Oregon and Washington included dominance by euphausiids in fish 30–49 cm fork length in the summer compared to dominance by fish and shrimp in the autumn; and in fish from sites off of California, a dominance of fish in the spring compared with a dominance of cannibalized Pacific hake in the autumn (Buckley and Livingston 1997).

Migration

The Pacific hake is unorthodox amongst the groundfishes because it is highly migratory, moving into many areas of the West Coast, including nearshore shelf, shelf break, and slope. Offshore stocks spawn off Baja California in the winter at depths exceeding 1000 m (Saunders and McFarlane 1997) then the mature adults begin moving northward and inshore, following food supply and Davidson currents (NOAA 1990). Post-spawned females tend to make this migration prior to post-spawned males (Saunders and McFarlane 1997). Pacific hake reach as far north as south eastern Alaska by late summer or fall (G. Fleisher, Pers. Comm.). They then begin the southern migration to spawning grounds and further offshore (Bailey *et al*. 1982, Dorn 1995, Smith 1995, Stauffer 1985).

Juveniles move to deeper water as they get older (NOAA 1990). During the summer, Pacific hake form extensive mid-water aggregations near the continental shelf break, with highest densities located over bottom depths of 200–300 m (Dorn *et al*. 1994).

Pacific hake school at depth during the day, then move to the surface and disband at night for feeding (McFarlane and Beamish 1986, Sumida and Moser 1984, Tanasichuck *et al*. 1991).

Stock Delineation

Smith (1995) recognizes three habitats utilized by the coastal stock of Pacific hake: 1) a narrow 30,000 km^2 feeding habitat near the shelf break of British Columbia, Washington, Oregon, and California populated 6–8 months per year; 2) a broad 300,000 km^2 open-sea area of California and Baja California populated by spawning adults in the winter and embryos and larvae for 4–6 months; and 3) a continental shelf area of unknown size off California and Baja California where juveniles brood.

3.2 Candidate Fishery

The specific scope of this full certification assessment is the Pacific west coast mid-water Pacific Hake (*Merluccius productus*) trawl fishery conducted in the US and Canadian Pacific EEZ waters west of California, Oregon, Washington and British Columbia (Fig. 1 and 2) and supplying their product to the at-sea and shore side processing facilities in British Columbia,

Washington, Oregon and California.

The certification clients eligible to use this certification are:

PACIFIC WHITING CONSERVATION COOPERATIVE
Address: 4039 21st Avenue West, Suite 400
City: Seattle, WA
Postal Code: 98199
Country : USA
Contact: Jan Jacobs
Email: jan.jacobs@americanseafoods.com

ASSOCIATION OF PACIFIC HAKE FISHERMEN
Address : 2295 Commissioner St
City: Vancouver BC
Postal Code : V5L 1A4
Country: Canada
Contact: Shannon Mann
Email : shannonmann@marinerseafoods.com

OREGON TRAWL COMMISSION
Address: 16289 Hwy 101 S, Suite C
City: Brookings, OR
Postal Code: 97415
Country : USA
Contact: Brad Pettinger
Email: bpettinger@ortrawl.net

3.3 Historical Management Context

Since implementation of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) in the U.S. and the declaration of a 200-mile fishery conservation zone in Canada in the late1970's, annual harvest quotas have been the primary management tool used to limit the catch of Pacific hake. Scientists from both countries have historically collaborated through the Technical Subcommittee of the Canada-US Groundfish Committee (TSC), and there have been informal agreements on the adoption of annual fishing policies.

However, during the 1990s, disagreements between the U.S. and Canada on the allocation of the acceptable biological catch (ABC) between U.S. and Canadian fisheries lead to quota overruns; 1991-1992 quotas summed to 128% of the ABC, while in 1993-1999 the combined quotas were 107% of the ABC on average. The 2002 and 2003 fishing years were somewhat different from years past in that the ABC of Pacific hake was utilized at an average of 87%. The Pacific hake agreement between the United States and Canada, signed in November 2003, allocated 73.88% and 26.12%, respectively, of the coastwide allowable biological catch to US and Canadian harvesters. Furthermore, the agreement establishes a Joint Technical Committee to exchange data and conduct stock assessments, which will be reviewed by a Scientific Review Group.

United States

Prior to 1989, catches in the U.S. zone were substantially below the harvest guideline, but since 1989 the entire harvest guideline has been caught with the exceptions in 2000, 2001 and 2003,

in which 90%, 96% and 96% of the U.S. quota were taken, respectively. The total U.S. catch has not significantly exceeded the harvest guideline for the U.S. zone, indicating that in-season management procedures have been effective.

In the U.S. zone, participants in the directed fishery are required to use pelagic trawls with a codend mesh that is at least 7.5 cm (3 inches). Regulations also restrict the area and season of fishing to reduce the bycatch of Chinook salmon, and several depleted rockfish stocks. More recently, yields in the U.S. zone have been restricted to level below optimum yields due to widow rockfish bycatch in the Pacific hake fishery. At-sea processing and night fishing (midnight to one hour after official sunrise) are prohibited south of 42° N latitude. Fishing is prohibited in the Klamath and Columbia River Conservation zones, and a trip limit of 10,000 pounds is established for Pacific hake caught inside the 100-fathom contour in the Eureka INPFC area. During 1992-95, the U.S. fishery opened on April 15, however in 1996 the opening date was advanced to May 15. Shore-based fishing is allowed after April 1 south of 42° N. latitude, but is limited to 5% of the shore-based allocation being taken prior to the opening of the main shore-based fishery. The main shore-based fishery opens on June 15. Prior to 1997, at-sea processing was prohibited by regulation when 60 percent of the harvest guideline was reached. The current allocation agreement, effective since 1997, divides the U.S. non-tribal harvest guideline between factory trawlers (34%), vessels delivering to at-sea processors (24%), and vessels delivering to shore-based processing plants (42%).

Shortly after the 1997 allocation agreement was approved by the PFMC, fishing companies with factory trawler permits established the Pacific Whiting Conservation Cooperative (PWCC). The primary role of the PWCC is to allocate the factory trawler quota between its members. Anticipated benefits of the PWCC include more efficient allocation of resources by fishing companies, improvements in processing efficiency and product quality, and a reduction in waste and bycatch rates relative to the former “derby” fishery in which all vessels competed for a fleet-wide quota. The PWCC also initiated recruitment research to support hake stock assessment. As part of this effort, PWCC sponsored a juvenile recruit survey in the summers of 1998 and 2001, which since 2002 is presently ongoing in collaboration with, and supported, by NMFS.

Canada

The Fisheries and Oceans Canada (DFO) is responsible for managing the Canadian hake fishery. Prior to 1987, the quota was not reached due to low demand for hake. In subsequent years the quota has been fully subscribed, and total catch has been successfully restricted to ±5% of the quota (Table 2).

Domestic requirements are given priority in allocating yield between domestic and joint-venture fisheries. During the season, progress towards the domestic allocation is monitored and any anticipated surplus is re-allocated to the joint-venture fishery. The Hake Consortium of British Columbia coordinates the day-to-day fleet operations within the joint-venture fishery. Through 1996, the Consortium split the available yield equally among participants or pools of participants. In 1997, an Individual Vessel Quota (IVQ) system was implemented for the British Columbia trawl fleet. IVQs of Pacific hake were allotted to license holders based on a combination of vessel size and landing history. Vessels are permitted to deliver Joint-

venture hake quota to domestic shore-side processors. However, vessels are not permitted to deliver domestic allocation to Joint-venture/processor operations at sea. There is no direct allocation to individual shoreside processors. License holders declare the proportion of their hake quota that will be landed in the domestic market, and shoreside processors must secure catch from vessel license holders.

3.4. The Fishery Area of Operation

The Pacific hake mid-water trawl fishery is conducted in the offshore waters of the US west coast states and British Columbia starting in April off northern California, and moving northward to British Columbia by late July. Fishing ceases in October. Both fisheries are conducted offshore within the limits of the US and Canadian Pacific EEZ.

The US at-sea sector's distribution of catch in 2004 ranged slightly stronger northward with roughly 50% of the catch occurring north and south of Newport, Oregon (Fig. 1). The total at sea sector harvested approximately 43% (90,200 mt) of the total U.S. catch of 210,400 mt. In 2005, at sea catches extended from south of Cape Blanco to Cape Flattery, with nearly even distribution north and south of Newport.

The US shore-based sector harvested 46% (96,200 mt) of the total U.S. catch of 210,400 mt in 2004. As in previous years, the dominate ports were Newport (38,800 mt) followed by Westport (30,000 mt) and Astoria (16,000 mt). The 2005 shore-based fishery began on June 15 and ended on August 18, and utilized approximately 94% of the commercial optimum yield of 97,469 mt.

Since 1996, the Washington Makah Indian Tribe has conducted a separate fishing in its "usual and accustomed fishing area." During the 2004 and 2005 fishing season, the distribution of Pacific hake provided favorable conditions to support the fishery in the Makah tribal fishing area; where the Makahs harvested approximately 74% (24,000 mt) of the Tribal allocation and 11% of total US catch in 2004. The 2005 Makah fishery, which began on May 1 and ended on August 15, utilized 28,325 mt, (approximately 81% of the 35,000 mt allocation).

The all-nation catch in Canadian waters was 53,585 mt in 2001, up from only 22,401 mt in 2000. In 2000, the shore-based landings in the Canadian zone hit a record low since 1990 due to a decrease in availability. Catches in 2001 increased substantially over those of 2000 for both the Joint Venture and shore-based sectors over catches in 2000, but were still below recommended TAC. Total Canadian catches in 2002 and 2003 were 50,769 mt and 62,090 mt, respectively, and were harvested exclusively by the shore-side sector; constituting nearly 87% of the total allocation of that country. Figure 2 below displays trawl locations for the 1999-2001 Canadian Pacific hake trawl fishery, clearly displaying the majority of the harvest for that year was concentrated off the southwest coast of Vancouver Island. In 2004, the allowable catch in Canada was 26.14% of the coastwide ABC, approximately 134,000 mt. Catches were nearly split equally between the shore-based and joint venture sectors, totaling 124,000 mt. Canadian Pacific hake catches were fully utilized in the 2005 fishing season with 85,284 mt and 15,178 mt taken by the Domestic and Joint Venture fisheries, respectively.

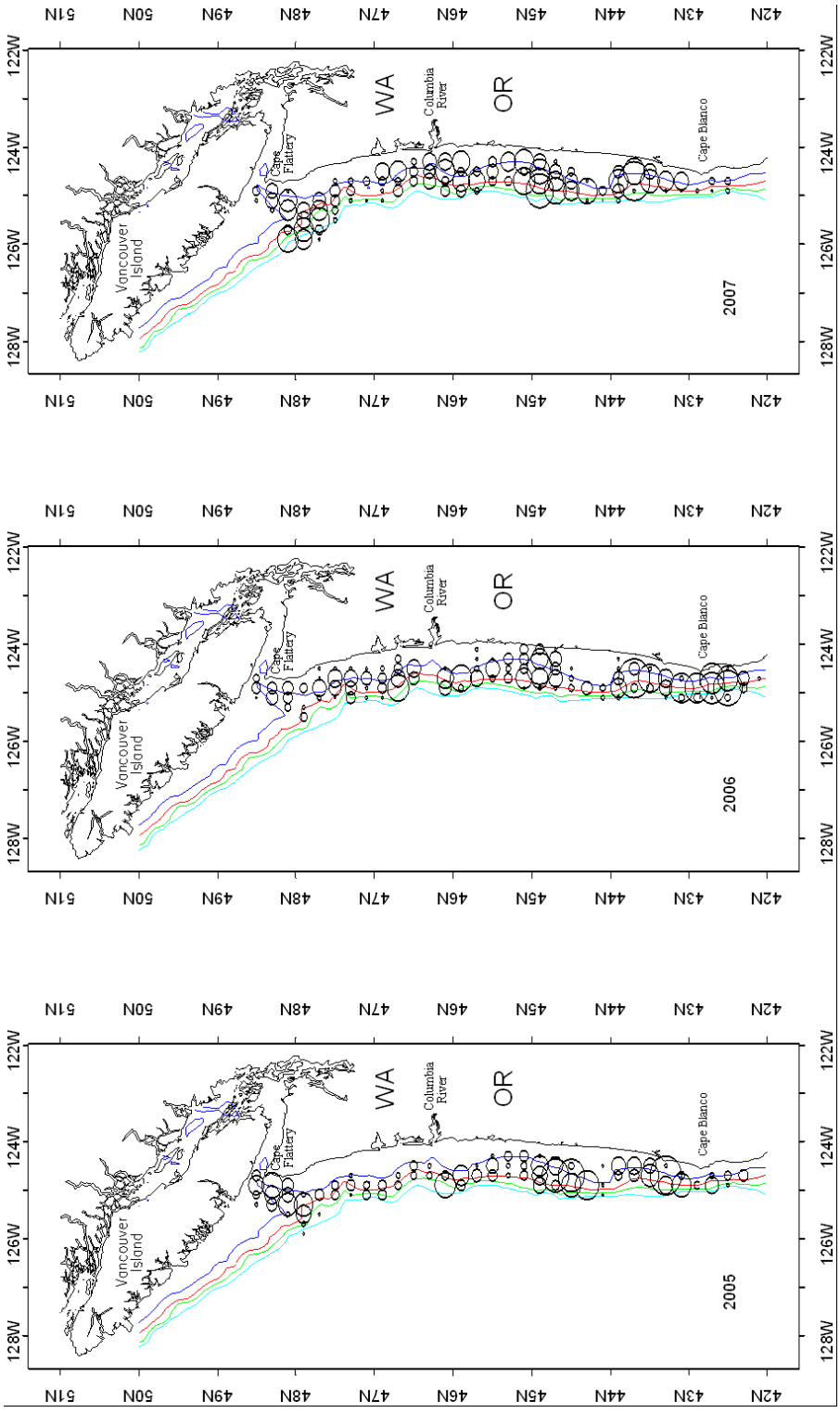


Figure 1: Plot of at-sea Pacific hake catches off the west coast of the U.S. in 2005 (bottom), 2006 (middle), and 2007 (top). Size of circle represents magnitude of individual hauls.

Source: Helser et al. 2008

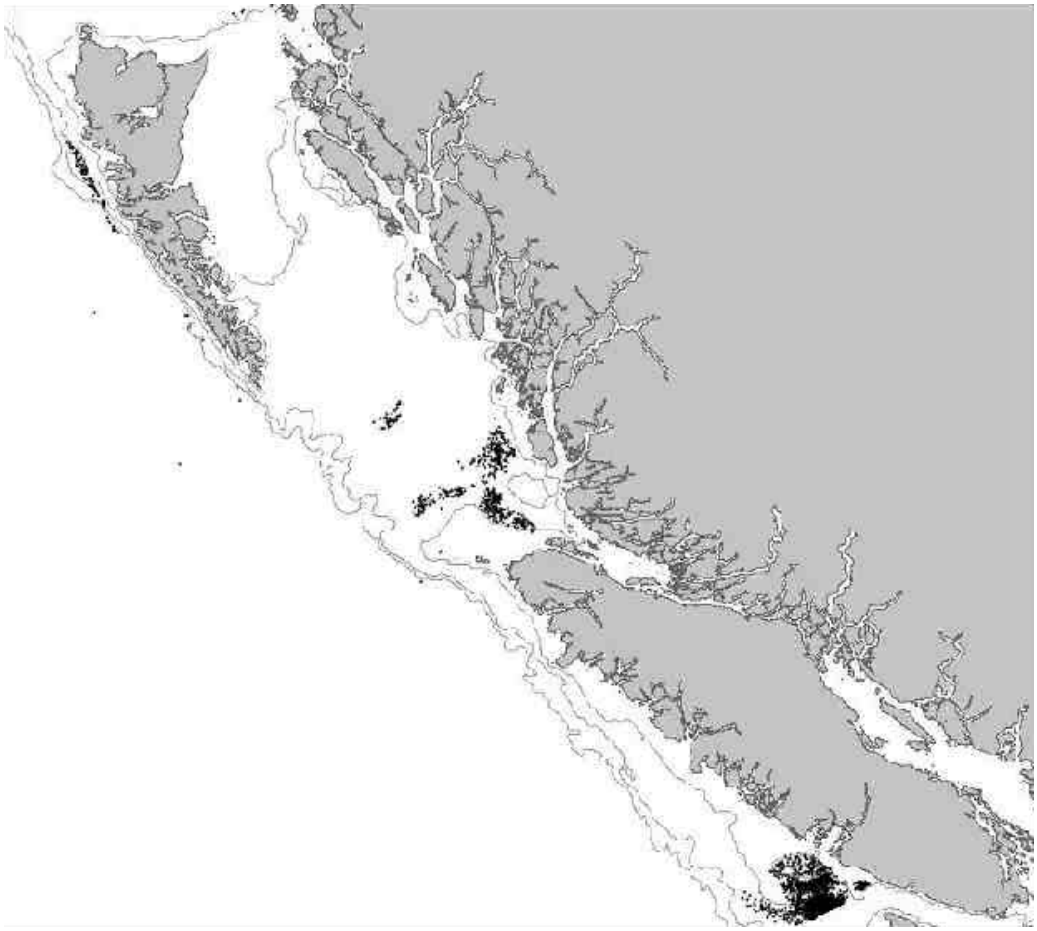


Figure 2: Canadian Pacific Hake trawl fishery locations from 1999-2001.
Source: Greer Consulting, 2002.

3.5 Fleet, gear and harvest controls

All Pacific hake are caught using pelagic trawl gear, and selectivities for these gears are largely determined by the spatial distribution of the stock relative to the spatial distribution of the fishing activities. Larger fish are primarily caught in Canadian waters, as larger hake have a tendency to migrate further north.

Chuenpagdee *et al*. (2003) elicited the opinions of the fishing industry, scientists, managers, and conservation groups on the severity of various fishing gear impacts on marine ecosystems, and found that mid-water trawls have relatively low impacts. Their finding agrees with the assessment of FAO/FIIT (2001) that this gear type has low collateral impact.

The Pacific Hake Agreement, which became law on January 12, 2007 when President Bush signed the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, governs the Pacific Hake fishery in the United States and Canada. The countries are

cooperatively implementing provisions of the Hake Agreement, including appointments to various technical, management, and advisory committees. During the implementation phase, the hake fishery is being managed in accordance with provisions in the Agreement, most notably the harvest sharing framework that allocates 73.88% of the annual harvest to the U.S. fisheries and 26.12% to the Canadian fishery. In both countries the fishery is based on limited entry.

In the United States the Pacific Hake fishery is managed by the National Marine Fisheries Service (NMFS), specifically the NMFS Northwest Region. The Canadian portion is managed by Fisheries and Oceans Canada.

US Pacific Hake Management Measures

Management measures applicable to the US Pacific hake fishery are outlined in Groundfish Fishery Management Plans. The Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish fishery was last issued in July 2008 The plan outlines goals and objectives to manage the fishery. To attain the goals and objectives identified in the FMP, managers ultimately only have a few tools available to them to manage fisheries sustainably. Biological variables such as recruitment, growth and natural mortality are beyond the control of managers while controlling fishing mortality through prevention of overfishing, and its resulting adverse biological, social and economic impacts, is the only means available to fisheries managers to ensure that populations remain at sustainable levels. For the Pacific hake fishery, the principle management measures used in the Washington, Oregon, and California region are:

- Measures to reduce bycatch and bycatch mortality. Primary bycatch reductions tools used include harvest limits (caps) on the amount of bycatch that can be captured from overfished species including canary, widow and darkblotched rockfish.
- At-sea observers and electronic monitoring. Catcher processors and motherships are required to carry one or two observers (depending upon vessel length) at all times. The shoreside fleet continues to experiment with electronic monitoring and also carries at-sea observers as per the groundfish FMP requirements (10 - 20% of catch).
- Defining authorized fishing gear and regulating the configuration and deployment of fishing gear, including mesh size in nets and escape panels.
- Restricting catches by defining prohibited species and establishing landing, trip frequency, bag, and size limits.
- Establishing fishing seasons– Catcher/processors and Mothership Seasons – May 15 to fishery closure, Shoreside Sector - Early Season (south of 42^{o} N, April 1 to June 1 or fishery closure) for California area fishery. Primary Season (north of 42^{o} N, June 15 to fishery closure).
- Closed Areas – There are two primary salmon conservation areas, Klamath River Conservation Zone and Columbia River Conservation Zone, which are closed to Pacific hake trawling due to concerns about salmon returning to these river systems. Rockfish Conservation Areas have been established to protect essential habitat for six overfished rockfish species that inhabit the continental shelf areas inside of approximately 150 fathoms.
- Set Pacific hake allowable biological catches (ABC) and optimum yields (OYs). The

process for specification of numerical harvest levels includes the estimation of ABC, the establishment of OYs and the calculation of specified allocations between harvest sectors.

Canadian Pacific Hake Management

A new three-year pilot plan for the integration of groundfish management, including Pacific hake, came into effect in April, 2006. The plan was drafted with the cooperation of the Commercial Groundfish Integrated Advisory Committee (CGIAC), the Commercial Industry Caucus, which is a subcommittee of CGIAC, Fisheries and Oceans Canada (DFO), and the Province of British Columbia. The CGIAC represents a variety of stakeholder groups, including the commercial industry, First Nations, environmental non-government organizations, the Sport Fishing Advisory Board, and the Coastal Community Network (DFO 2006a). The Integrated Fisheries Management Plan (IFMP) is intended to bring the groundfish fisheries in line with the Pacific Fisheries Reform principles that were announced in 2005. These principles include improving both the sustainability of fish populations and the economic viability of the fishery, strengthening DFO programs, and increasing First Nations' access to fisheries (DFO 2006b). The IFMP has been updated annually, and an amended integrated fisheries management plan for groundfish is in place, effective March 08, 2008 to February 20, 2009.

Under Canada's Ocean's Act (1996) and the subsequent Ocean Strategy (2002), fisheries management is required to move toward the overarching objective of ecosystem-based management. Management strategies for groundfish fisheries are now directed at reducing bycatch of vulnerable species and minimizing the adverse effect of fishing on sensitive benthic habitats through area closures (particularly for the trawl fishery in Eastern Queen Charlotte Sound and Hecate Strait) and via the creation of Rockfish Conservation Areas in coastal British Columbia.

The IFMP will support the Species At Risk Act and the Oceans Act by adopting an ecosystem-based approach to management and data collection. The fundamental problem of poor catch monitoring leading to a lack of information on many species captured in the groundfish fishery is addressed under the new plan. Management reforms were developed in light of the following guiding principles for the groundfish sector (quoting DFO (2006a)):

1) All rockfish catch must be accounted for;
2) Rockfish catches will be managed according to established rockfish management areas;
3) Fishers will be individually accountable for their catch;
4) New monitoring standards will be established and implemented to meet the above three objectives; and;
5) Species and stocks of concern will be closely examined and actions such as reduction of TACs, and other catch limits will be considered and implemented to be consistent with the precautionary approach for management.

The new management measures for the Pacific hake fleet include the requirement for 10% at-sea observer coverage. For any hake fishing north of the 49th parallel or by headed-gutted freezer vessels, 100% at-sea observer coverage is required. In addition, the entire groundfish

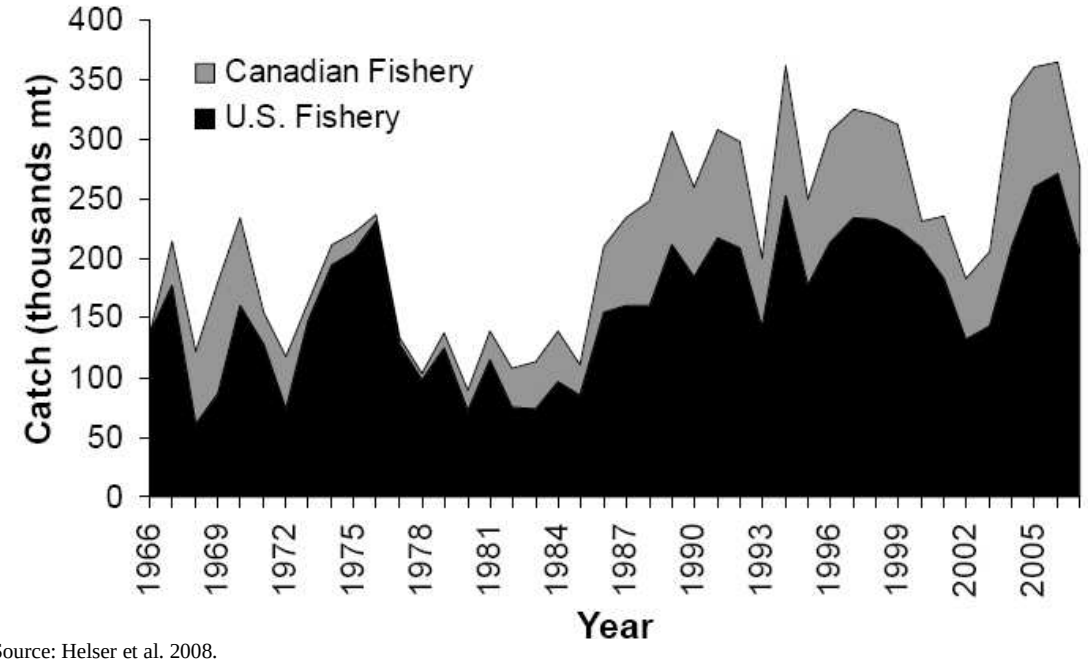
fleet, inclusive of all shoreside Pacific hake vessels, is subject to independent dockside monitoring of 100% of their catch. Other management measures include individual quotas for rockfish, and a quota reallocation program that is intended to extend coverage to bycatch species (DFO, 2006a).

The IFMP lists the conditions under which fishing will be conducted. Fishing regulations for the trawl sector include: species prohibitions, gear regulations, maximum mortality rates for fish released at sea, size limits, sector and species caps, area/season closures, and TACs. The plan includes DFO enforcement strategies such as over-flights and dockside and at-sea inspections, and it outlines the financial responsibilities of the industry for funding the electronic at-sea and dockside monitoring programs.

3.6. Catch

Fishery landings from 1966 to 2005 have averaged 217 thousand t (Table 2), with a low of 90 thousand mt in 1980 and a peak harvest of 362 thousand mt in 1994 (Figure 3). Recent landings have been above the long term average, at 360 thousand mt in 2005 and 2006. Catches in both of these years were predominately comprised by the large 1999 year class. The United States has averaged 159 thousand mt, or 74.6% of the total landings over the time series, with Canadian catch averaging 54 thousand mt. The 2004 and 2005 landings had similar distributions, with 62.9 and 72.1%, respectively, harvested by the United States fishery. The current assessment model assumes no discarding mortality of pacific hake (Helser et al. 2007).

Figure 3: Graphic of Pacific hake landings (1000s mt) by nation, 1966 to 2007



Source: Helser et al. 2008.

Catch history for the U.S. and Canadian fishery for the same time period is detailed in Table 2 below. The table demonstrates the catch by sector and nation. As can be seen, the US foreign

fishery effort ceased in 1989 and the joint ventures commenced in 1978 and ceased in 1991. The domestic at-sea sector effectively replaced the JV sector in 1991. The Makah tribal fishery in the "usual and accustomed" places started in 1996.

In the Canadian fishery, the foreign fleet fishery ceased operations in 1991. The JV sector started in 1978 and continued until 2001. The JV fishery stopped during 2002 and 2003 and restarted in 2004 and continued in 2005 and 2006.

Table 2: Annual Pacific Hake catches for US and Canadian harvest sectors, 1966 to 2007 (1,000 t). *Source: Helser et al. 2008.*

	U.S.						Canada				U.S. and
			Domestic								Canada
Year	Foreign	JV	At-sea	Shore	Tribal	Total	Foreign	JV	Shore	Total	total
1966	137.000	0.000	0.000	0.000	0.000	137.000	0.700	0.000	0.000	0.700	137.700
1967	168.699	0.000	0.000	8.963	0.000	177.662	36.713	0.000	0.000	36.713	214.375
1968	60.660	0.000	0.000	0.159	0.000	60.819	61.361	0.000	0.000	61.361	122.180
1969	86.187	0.000	0.000	0.093	0.000	86.280	93.851	0.000	0.000	93.851	180.131
1970	159.509	0.000	0.000	0.066	0.000	159.575	75.009	0.000	0.000	75.009	234.584
1971	126.485	0.000	0.000	1.428	0.000	127.913	26.699	0.000	0.000	26.699	154.612
1972	74.093	0.000	0.000	0.040	0.000	74.133	43.413	0.000	0.000	43.413	117.546
1973	147.441	0.000	0.000	0.072	0.000	147.513	15.125	0.000	0.001	15.126	162.639
1974	194.108	0.000	0.000	0.001	0.000	194.109	17.146	0.000	0.004	17.150	211.259
1975	205.654	0.000	0.000	0.002	0.000	205.656	15.704	0.000	0.000	15.704	221.360
1976	231.331	0.000	0.000	0.218	0.000	231.549	5.972	0.000	0.000	5.972	237.521
1977	127.013	0.000	0.000	0.489	0.000	127.502	5.191	0.000	0.000	5.191	132.693
1978	96.827	0.856	0.000	0.689	0.000	98.372	3.453	1.814	0.000	5.267	103.639
1979	114.909	8.834	0.000	0.937	0.000	124.680	7.900	4.233	0.302	12.435	137.115
1980	44.023	27.537	0.000	0.792	0.000	72.352	5.273	12.214	0.097	17.584	89.936
1981	70.365	43.556	0.000	0.839	0.000	114.760	3.919	17.159	3.283	24.361	139.121
1982	7.089	67.464	0.000	1.024	0.000	75.577	12.479	19.676	0.002	32.157	107.734
1983	0.000	72.100	0.000	1.050	0.000	73.150	13.117	27.657	0.000	40.774	113.924
1984	14.722	78.889	0.000	2.721	0.000	96.332	13.203	28.906	0.000	42.109	138.441
1985	49.853	31.692	0.000	3.894	0.000	85.439	10.533	13.237	1.192	24.962	110.401
1986	69.861	81.640	0.000	3.463	0.000	154.964	23.743	30.136	1.774	55.653	210.617
1987	49.656	105.997	0.000	4.795	0.000	160.448	21.453	48.076	4.170	73.699	234.147
1988	18.041	135.781	0.000	6.876	0.000	160.698	38.084	49.243	0.830	88.157	248.855
1989	0.000	203.578	0.000	7.418	0.000	210.996	29.753	62.618	2.563	94.934	305.930
1990	0.000	170.972	4.713	8.115	0.000	183.800	3.814	68.313	4.022	76.149	259.949
1991	0.000	0.000	196.905	20.600	0.000	217.505	5.605	68.133	16.178	89.916	307.421
1992	0.000	0.000	152.449	56.127	0.000	208.576	0.000	68.779	20.048	88.827	297.403
1993	0.000	0.000	99.103	42.119	0.000	141.222	0.000	46.422	12.355	58.777	199.999
1994	0.000	0.000	179.073	73.656	0.000	252.729	0.000	85.162	23.782	108.944	361.673
1995	0.000	0.000	102.624	74.965	0.000	177.589	0.000	26.191	46.193	72.384	249.973
1996	0.000	0.000	112.776	85.127	14.999	212.902	0.000	66.779	26.395	93.174	306.076
1997	0.000	0.000	121.173	87.410	24.840	233.423	0.000	42.565	49.227	91.792	325.215
1998	0.000	0.000	120.452	87.856	24.509	232.817	0.000	39.728	48.074	87.802	320.619
1999	0.000	0.000	115.259	83.419	25.844	224.522	0.000	17.201	70.132	87.333	311.855
2000	0.000	0.000	116.090	85.828	6.500	208.418	0.960	15.059	6.382	22.401	230.819
2001	0.000	0.000	102.129	73.474	6.774	182.377	0.000	21.650	31.935	53.585	235.962
2002	0.000	0.000	63.258	45.708	23.148	132.114	0.000	0.000	50.769	50.769	182.883
2003	0.000	0.000	67.473	51.256	24.763	143.492	0.000	0.000	62.090	62.090	205.582
2004	0.000	0.000	90.258	89.381	30.845	210.484	0.000	58.892	65.345	124.237	334.721
2005	0.000	0.000	150.400	74.147	35.297	259.844	0.000	15.178	85.284	100.462	360.306
2006	0.000	0.000	137.564	97.230	35.469	270.263	0.000	13.751	80.011	93.762	364.025
2007	0.000	0.000	107.489	66.640	29.850	203.979	0.000	6.780	65.325	72.105	276.084
Average 1966-2007						163.179				55.797	218.977

3.7 Bycatch

The coastal hake fishery is a targeted mid-water trawl fishery that generally has low bycatch rates. Dorn (1997) estimated that the non-directed catch in the at-sea fishery is less than 3% by weight. The common bycatch species are yellowtail rockfish, widow rockfish, Pacific ocean perch, jack mackerel, and Pacific mackerel (Dorn, 1997). Chinook salmon are also captured, but at very low rates (Dorn 1997) estimated at 4,000-6,000 individuals per year. However, the bycatch of salmon is a particular concern because of the extremely low levels of abundance of many West Coast salmon stocks.

Similar bycatch species are taken by the Canadian Pacific hake fleet. A species of particular concern is bocaccio, which is listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), but has not yet been designated under Canada's Species at Risk Act. Hake is managed under the Groundfish Integrated Fisheries Management Plan (DFO, 2006a), which recognizes the multi-species nature of groundfish catches in British Columbia. This plan prohibits the retention of halibut, salmon, sturgeon, herring, and wolf eel. All other species are subject to coastwide quotas under the individual vessel quota system (DFO, 2006a). The bycatch allowance for the hake fishery depends on whether or not the vessel is subject to observer monitoring (DFO, 2006b). Beginning in 2004, the proceeds of all bocaccio landings have been directed toward research and management. This has greatly reduced bocaccio catches (DFO, 2006a). In addition to these management measures, 164 coastwide RCAs have been closed to the groundfish fishery in the Canadian EEZ off the coast of British Columbia (DFO 2006).

3.8 Interactions with Protected, Endangered, Threatened Species

Between 1990 and 1999, NMFS issued six Biological Opinions under the Endangered Species Act (ESA) pertaining to the effects of the Pacific Coast groundfish fisheries on several West Coast stocks of chinook, chum, and steelhead salmon. The Opinions concluded that the groundfish fishery did not pose added threats to these resources, but defined an incidental take threshold for the hake fishery of 11,000 chinook (NMFS, 2006). Annual chinook bycatch has averaged 7300 over the past 15 years, but the threshold was exceeded during the 1995, 2000, 2005 hake fisheries (PFMC and NMFS, 2006; NMFS, 2006). NMFS issued a Supplemental Biological Opinion in 2006 that addressed the 2005 overage, and determined that the hake fishery did not constitute a significant threat to the recovery of the chinook stocks (NMFS, 2006). The incidental take threshold for chinook remains in place.

Seven groundfish species have been declared overfished in the U.S. since the Sustainable Fisheries Act was passed (NMFS, 2003). These species include bocaccio, canary rockfish, cowcod, darkblotched rockfish, Pacific ocean perch (POP), widow rockfish, and yelloweye rockfish. In general, under U.S. management these species may not be taken or retained, but when captured in association with fisheries targeting other stocks they are subject to bycatch caps. Bycatch limits for widow and canary rockfish have restricted the U.S. hake yields to below optimum in recent years (Helser *et al*., 2008). In addition to bycatch restrictions, the incidental catches of overfished species are managed through gear restrictions and closures of

Rockfish Conservation Areas (RCAs) (NMFS, 2003).

Within the Canadian component of the fishery, a species of particular concern with regards to bycatch is bocaccio. While bocaccio has not yet been listed under SARA, it is designated as threatened by Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Beginning in 2004, the proceeds for all bocaccio landings have been directed toward research and management, greatly reducing bocaccio catches (DFO 2008).

Under Canada's Ocean's Act (1996) and the subsequent Ocean Strategy (2002), fisheries management is required to move toward the overarching objective of ecosystem-based management. Management strategies for groundfish fisheries are now directed at reducing bycatch of vulnerable species and minimizing the adverse effect of fishing on sensitive benthic habitats through area closures (particularly for the trawl fishery in Eastern Queen Charlotte Sound and Hecate Strait) and via the creation of Rockfish Conservation Areas in coastal British Columbia.

4.0 MANAGEMENT SYSTEM

4.1 Management System and Objectives

Management of the fishery on a national level is the responsibility of the National Marine Fisheries Service (NMFS) and Fisheries and Oceans Canada in the US and Canada respectively. In the United States, management measures for the Pacific hake fishery are described in the Pacific Coast Groundfish Management Plan and federal annual fishery specifications documents and the Code of Federal Register. The Canadian management functions for the BC groundfish fishery are detailed in the Groundfish Integrated Fisheries Management Plan. The groundfish trawl portion of groundfish management can be found in Appendix 8 of the IFMP (Groundfish Trawl Commercial Harvest Plan). The Pacific Offshore Hake Harvest Plan is an addendum to the annual IFMP for groundfish. These management plans are described in more detail in the following section.

On November 21, 2003 the "Agreement between the Government of the United States and the Government of Canada on Pacific Whiting/Hake" was signed in Seattle, Washington. Under this agreement, recent Pacific whiting/hake stock assessments (2004, 05, 06, 07) have been jointly prepared and reviewed by U.S. and Canadian scientists. Although the agreement has been ratified by both countries, it has not been implemented yet due to on-going administrative constraints.

Upon ratification, the Agreement will result in the establishment of four consultative groups with equal membership from each country or industry group and each with specific mandates, as specified below. The exact organizational structure of the Agreement organization has not yet been determined.

Joint Technical Committee (JTC) a five member group whose primary responsibilities include:

- develop stock assessment criteria and methods, and design survey methods;
- exchange survey information, including information on stock abundance, distribution, and age composition;
- exchange and review relevant annual catch and biological data, including information provided by the public; and;
- provide, by no later than February 1 of each year unless otherwise directed by the Joint Management Council (JMC), a stock assessment that includes scientific advice on the annual potential yield of the offshore hake resource that may be caught for that fishing year, taking into account uncertainties in stock assessment and stock productivity parameters and evaluating the risk of errors in parameter estimates produced in the assessment.

A Scientific Review Group (SRG), a six member group, with the following responsibilities:

- propose its terms of reference for approval by the JMC;
- review the stock assessment criteria and methods and survey methodologies

used by the JTC;

- provide, by no later than March 1 of each year, unless otherwise directed by the JMC, a written technical review of the stock assessment and its scientific advice on annual potential yield; and
- perform other duties and functions that may be referred to it by the JMC

A Joint Management Council (JMC), which consists of 8 members, with the following responsibilities.

- provide the SRG and JTC the direction necessary to guide their deliberations;
- refer any technical issues or other duties to the SRG or JTC as it deems appropriate;
- consider information on management measures employed by the Parties; and
- review the advice of the JTC, the SRG, and the Advisory Panel and, by no later than March 25 of each year, recommend for approval of the Parties the overall TAC for that year, calculate each Party's individual TAC pursuant to paragraph 2 of Article III, and identify any adjustments pursuant to paragraph 5 of this Article.

An Advisory Panel whose members shall be individuals knowledgeable or experienced in the harvesting, processing, marketing, management, conservation, or research of the Pacific hake fisheries and may not be employees of either Party. Primary responsibilities include:

- compile and provide to the Parties, by no later than March 25 of each year, the names of at least three scientific experts as candidates for the JTC and the names of at least five scientific experts as candidates for the SRG, for appointment in the following year;
- review the advice of the SRG and JTC;
- review the management of the fisheries of the two Parties during the previous year; and
- make recommendations to the JMC regarding the overall TAC.

The management objectives of the Agreement are as follows:

(a) For the purposes of this Agreement, the default harvest rate shall be F-40 percent with a 40/10 adjustment. Having considered any advice provided by the JTC, the SRG or the Advisory Panel, the JMC may recommend to the Parties a different harvest rate if the scientific evidence demonstrates that a different rate is necessary to sustain the offshore hake resource. If the Parties approve such a recommendation, they shall so inform the JMC.

(b) The United States' share of the overall TAC shall be 73.88 percent. The Canadian share of the overall TAC shall be 26.12 percent. This division shall apply for an initial nine-year period, and thereafter unless the Parties agree in writing to adjust it. Any such adjustment shall take effect in the following year, unless the Parties agree otherwise.

4.2 Management Plan

United States

The following description comes primarily from the Amendment 19 of the Pacific Coast Groundfish Fishery Management Plan (FMP), released by the Pacific Fishery Management Council in September 2006.

Prior to implementation of the Pacific Coast Groundfish Fishery Management Plan (FMP) on October 5, 1982, management of domestic groundfish fisheries was under the jurisdiction of the states of Washington, Oregon, and California. Management of overlapping fisheries and lack of regulatory uniformity led to the formation of the Pacific States Marine Fisheries Commission (PSMFC) in 1947. PSMFC had no regulatory power but acted as a coordinating entity with authority to submit specific recommendations to states for their adoption. The 1977 Fishery Conservation and Management Act (later amended and renamed the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) established eight regional fishery management Councils, including the Pacific Council. Between 1977 and the implementation of the groundfish FMP in 1982, state agencies worked with the Council to address conservation issues. Specifically, in 1981, managers proposed a rebuilding program for Pacific ocean perch.

Management of foreign fishing operations began in February 1967 when the U.S. and U.S.S.R. signed the first bilateral fishery agreement affecting trawl fisheries off Washington, Oregon, and California, other agreements were subsequently signed with Japan and Poland. Each of these agreements was renegotiated to reduce the impact of foreign fishing on important West Coast stocks, primarily rockfish, Pacific hake, and sablefish. When the U.S. extended its jurisdiction to 200 miles (upon signing the Fishery Conservation and Management Act of 1976), the National Marine Fisheries Service (NMFS) developed, and the Secretary implemented, the preliminary management plan for the foreign trawl fishery off the Pacific Coast. From 1977 to 1982, the foreign fishery was managed under that plan. Many of these regulations were incorporated into this FMP, which provided for continued management of the foreign fishery.

Joint-venture fishing, which primarily targeted Pacific hake, where domestic vessels caught the fish to be processed aboard foreign vessels, began in 1979 and by 1989 had entirely supplanted directed foreign fishing. Joint-venture fisheries were then rapidly replaced by wholly domestic processing; by 1991 foreign participation had ended and U.S.-flagged motherships, catcher-processors, and shore-based vessels had taken over the Pacific hake fishery. Since then U.S. fishing vessels and seafood processors have fully utilized Pacific Coast fishery resources.

Since it was first implemented in 1982, the Council has amended the groundfish FMP 20 times in response to changes in the fishery, reauthorizations of the Magnuson-Stevens Act, and litigation that invalidated provisions incorporated by earlier amendments. During the first 10 years of plan implementation, up to 1992, the Secretary approved six amendments. The most significant of these was Amendment 4 approved in 1990. In addition to a comprehensive update and reorganization of the FMP, Amendment 4 established additional framework

procedures for establishing and modifying management measures. Another important change was implemented in 1992 with Amendment 6, which established a license limitation (limited entry) program intended to address overcapitalization by restricting further participation in groundfish trawl, longline, and trap fisheries.

The next decade, through 2002, saw the approval of another seven amendments. Amendments included modification of the limited entry program by establishing a sablefish endorsement for longline and pot permits; responses to changes in the Magnuson-Stevens Act due to the 1996 Sustainable Fisheries Act, primarily to identify essential fish habitat (EFH), more actively reduce bycatch and bycatch mortality, and strengthen conservation measures to both prevent fish stocks from becoming overfished and promote rebuilding of any stocks that had become overfished.

Most of the amendments adopted since 2001 deal with legal challenges to the three Sustainable Fisheries Act of 1996 (SFA)-related amendments mentioned above; including dealing with overfishing, bycatch monitoring and mitigation, and EFH. In relation to the first of these three issues, the Magnuson-Stevens Act now requires FMPs to identify thresholds for both the fishing mortality rate constituting overfishing and the stock size below which a stock is considered overfished. Once the Secretary determines a stock is overfished, the Council must develop and implement a plan to rebuild it to a healthy level. Since these thresholds were established for Pacific Coast groundfish, nine stocks have been declared overfished. More recent amendments established the current regime for managing overfished species, specifies the procedures the Council and NMFS must follow to establish and modify management measures.

Goals and Objectives for Managing the Pacific Coast Groundfish Fishery

The Council is committed to developing long-range plans for managing the Washington, Oregon, and California groundfish fisheries that will promote a stable planning environment for the seafood industry, including marine recreation interests, and will maintain the health of the resource and environment. In developing allocation and harvesting systems, the Council will give consideration to maximizing economic benefits to the United States, consistent with resource stewardship responsibilities for the continuing welfare of the living marine resources. Thus, management must be flexible enough to meet changing social and economic needs of the fishery as well as to address fluctuations in the marine resources supporting the fishery. The following goals have been established in order of priority for managing the West Coast groundfish fisheries, to be considered in conjunction with the national standards of the Magnuson-Steven Act.

Management Goals

Goal 1 - Conservation. Prevent overfishing and rebuild overfished stocks by managing for appropriate harvest levels and prevent, to the extent practicable, any net loss of the habitat of living marine resources.
Goal 2 - Economics. Maximize the value of the groundfish resource as a whole.
Goal 3 - Utilization. Within the constraints of overfished species rebuilding requirements, achieve the maximum biological yield of the overall groundfish fishery, promote year-round

availability of quality seafood to the consumer, and promote recreational fishing opportunities.

Objectives

To accomplish these management goals, a number of objectives will be considered and followed as closely as practicable:

Conservation

Objective 1. Maintain an information flow on the status of the fishery and the fishery resource which allows for informed management decisions as the fishery occurs.

Objective 2. Adopt harvest specifications and management measures consistent with resource stewardship responsibilities for each groundfish species or species group. Achieve a level of harvest capacity in the fishery that is appropriate for a sustainable harvest and low discard rates, and which results in a fishery that is diverse, stable, and profitable. This reduced capacity should lead to more effective management for many other fishery problems.

Objective 3. For species or species groups that are overfished, develop a plan to rebuild the stock as required by the Magnuson-Stevens Act.

Objective 4. Where conservation problems have been identified for non-groundfish species and the best scientific information shows that the groundfish fishery has a direct impact on the ability of that species to maintain its long-term reproductive health, the Council may consider establishing management measures to control the impacts of groundfish fishing on those species. Management measures may be imposed on the groundfish fishery to reduce fishing mortality of a non-groundfish species for documented conservation reasons. The action will be designed to minimize disruption of the groundfish fishery, in so far as consistent with the goal to minimize the bycatch of non-groundfish species, and will not preclude achievement of a quota, harvest guideline, or allocation of groundfish, if any, unless such action is required by other applicable law.

Objective 5. Describe and identify essential fish habitat (EFH), adverse impacts on EFH, and other actions to conserve and enhance EFH, and adopt management measures that minimize, to the extent practicable, adverse impacts from fishing on EFH.

Economics

Objective 6. Attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.

Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.

Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Utilization

Objective 9. Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries.

Objective 10. Recognizing the multispecies nature of the fishery and establish a concept of managing by species and gear or by groups of interrelated species.
Objective 11. Develop management programs that reduce regulations-induced discard and/or which reduce economic incentives to discard fish. Develop management measures that minimize bycatch to the extent practicable and, to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. Promote and support monitoring programs to improve estimates of total fishing-related mortality and bycatch, as well as those to improve other information necessary to determine the extent to which it is practicable to reduce bycatch and bycatch mortality.

Social Factors

Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.
Objective 13. Minimize gear conflicts among resource users.
Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.
Objective 15. Avoid unnecessary adverse impacts on small entities.
Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.
Objective 17. Promote the safety of human life at sea.

Canada

A three-year pilot plan for the integration of groundfish management, including Pacific hake, came into effect in April, 2006. The plan was drafted with the cooperation of the Commercial Groundfish Integrated Advisory Committee (CGIAC), the Commercial Industry Caucus, which is a subcommittee of CGIAC, Fisheries and Oceans Canada (DFO), and the Province of British Columbia. The CGIAC represents a variety of stakeholder groups, including the commercial industry, First Nations, environmental non-government organizations, the Sport Fishing Advisory Board, and the Coastal Community Network (DFO 2006a). The Integrated Fisheries Management Plan (IFMP) is intended to bring the groundfish fisheries in line with the Pacific Fisheries Reform principles that were announced in 2005. These principles include improving both the sustainability of fish populations and the economic viability of the fishery, strengthening DFO programs, and increasing First Nations' access to fisheries (DFO 2006b).

The current Integrated Fisheries Management Plan (IFMP) for groundfish in British Columbia for the fishing year March 8, 2008 to March 31, 2009 is in place. This is year three of the comprehensive management plan for all groundfish fisheries that replaces the individual plans that were produced previous to the pilot project (DFO 2008).

Under Canada's Ocean's Act (1996) and the subsequent Ocean Strategy (2002), fisheries management is required to move toward the overarching objective of ecosystem-based management. Management strategies for groundfish fisheries are now directed at reducing bycatch of vulnerable species and minimizing the adverse effect of fishing on sensitive benthic

habitats through area closures (particularly for the trawl fishery in Eastern Queen Charlotte Sound and Hecate Strait) and via the creation of Rockfish Conservation Areas in coastal British Columbia.

The IFMP supports the Species at Risk Act and the Oceans Act by adopting an ecosystem-based approach to management and data collection. The fundamental problem of poor catch monitoring leading to a lack of information on many species captured in the groundfish fishery is addressed under the new plan. Management reforms were developed in light of the following guiding principles for the groundfish sector (quoting DFO (2006a)):

1) All rockfish catch must be accounted for;
2) Rockfish catches will be managed according to established rockfish management areas;
3) Fishers will be individually accountable for their catch;
4) New monitoring standards will be established and implemented to meet the above three objectives; and
5) Species and stocks of concern will be closely examined and actions such as reduction of TACs, and other catch limits will be considered and implemented to be consistent with the precautionary approach for management

The new management measures for the Pacific hake fleet include the requirement for 10% at-sea observer coverage. In addition, the entire groundfish fleet, inclusive of all shoreside Pacific hake vessels is subject to independent dockside monitoring of 100% of their catch. Other management measures include individual quotas for rockfish, and a quota reallocation program that is intended to extend coverage to bycatch species (DFO, 2006a).

The IFMP lists the conditions under which fishing will be conducted. Fishing regulations for the trawl sector include: species prohibitions, gear regulations, maximum mortality rates for fish released at sea, size limits, sector and species caps, area/season closures, and TACs. The plan includes DFO enforcement strategies such as over-flights and dockside and at-sea inspections, and it outlines the financial responsibilities of the industry for funding the electronic at-sea and dockside monitoring programs.

DFO will continue to work with the CGIAC, CIC and First Nations in 2008 to develop an evaluation framework for the pilot that will occur after the third year. In addition, there are provisions for annual review, and adjustments to the pilot could be made in-season if required (DFO 2008).

5.0 STOCK HEALTH EVALUATION

5.1 Stock Health Monitoring

The current assessment for the coastwide stock is Helser *et al*. (2008). The status of the offshore stock has been determined by a single-sex age-structured model (ASM) since the 1980s. A stock synthesis model that incorporates fishery catch-at-age data, and acoustic survey estimates of population biomass and age composition has been the primary assessment

method since 1989. The model platform has changed over time as new analytical techniques have been developed. More recently, the assessment has been modified because model diagnostics and the Stock Assessment Review Panels (e.g., STAR Panel, 2005) indicated that the model may be over-parameterized and unnecessarily complex. To address these possibilities, parallel assessments were run in 2006 using the current ('base') stock assessment model and a new ('alternative') model structure that was developed using the Stock Synthesis Modeling Framework (SS2) (Methot, 2005).

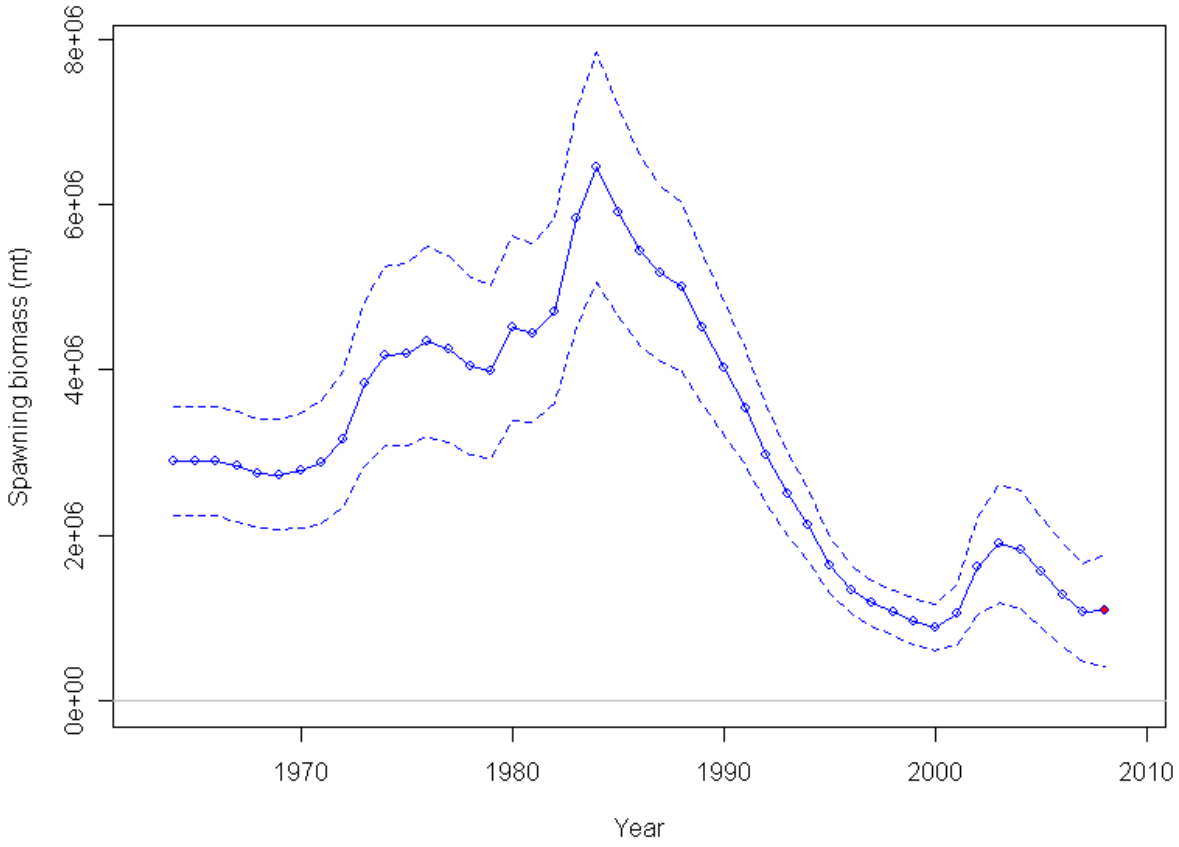
Conversion of the previous hake model into SS2 was guided by three principles: 1) the incorporation of less derived data, 2) explicitly model the underlying hake growth dynamic and 3) achieve parsimony in terms on model complexity. The most recent 2007 assessment represented an update of the 2006 assessment model with fishery data through 2006 and the inclusion of a new coastwide Pacific hake recruitment index. The coastwide recruitment index was derived from data collected from SWFSC Santa Cruz Laboratory's and Pacific hake Conservation Cooperative/National Marine Fisheries Service mid-water trawl surveys. Additional acoustic survey information will not be available until the winter of 2007 (Helser et al., 2007).

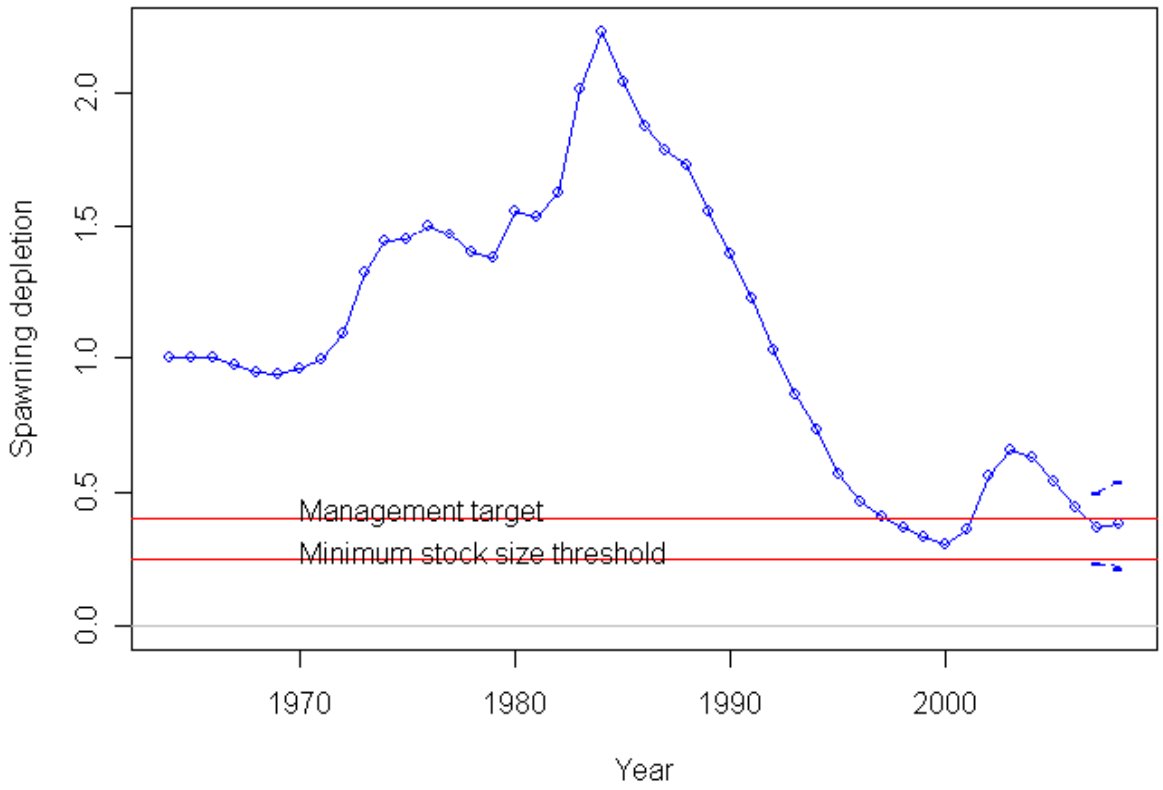
Helser *et al*. (2008) reconstruct the dynamics of the population back to 1966 using both survey and fisheries data. Fisheries data include total catches (1966-2006), length, and age compositions (various years, depending on fishery). An index of coast-wide biomass is available from the Joint U.S.-Canada Triennial Acoustic/Mid-water Trawl surveys (1977, 1980, 1983, 1986, 1989, 2001, 2003, and 2005). The 1986 data are generally excluded from analyses because of transducer and calibration problems during the survey that year. Length and age data are also available from these surveys. An index of young-of-the-year abundance is available from the Santa Cruz laboratory larval rockfish surveys (1986-2005) and the PWCC/NMFS mid-water trawl surveys (2001-2006). A coastwide index of hake recruitment was generated based on data from both the SWFSC Santa Cruz and PWCC/NMFS surveys to account for recent northerly extension of hake recruitment along the coast.

As in the previous hake model, the US and Canadian fisheries were modeled separately. The model also used biological parameters to estimate spawning and population biomass to obtain predictions of fishery and survey biomass from the parameters estimated by the model. The parameters included: proportion mature at length (not estimated in model), population allometric growth relationship, as estimated from the acoustic survey, initial estimates of growth including CVs of length at age for the youngest and oldest fish, and natural mortality (Helser et al. 2007).

Pacific hake spawning biomass peaked in 1984 at 4.6 million mt (5.1 million for the alternative model) and declined rapidly to 0.88 (1.0) million mt in 2000 (Helser *et al*., 2006). During this time the population experienced increasing fishing mortality and few large recruitment events. Spawning biomass increased to 1.68 (2.1) million mt in 2003 due to the presence of the strong 1999 year class, but has since declined as both the U.S. and Canadian fisheries exploit this dominant year class. The spawning biomass in 2007 was estimated to be 1.15 million mt, representing approximately 32.0% (~95%CI range from 24.3 to 36.7%) of the unfished level under the base model. Under the alternative model, spawning biomass is 1.6 million mt with an associated relative depletion of 39.8% (~95%CI range from 30.7% to 48.8%).

Figure 4: Estimated spawning biomass time-series with approximate asymptotic 95% confidence intervals and spawning depletion (fraction of unfished biomass). Source: Helser *et al*, 2008.





5.2 Current Stock Status

The 2008 stock assessment estimated spawning potential ration (SPR) for Pacific hake was above the proxy target of 40% for the history of the fishery. In terms of its exploitation status, Pacific hake are presently just below target biomass level (40% unfished biomass) and above the target SPR rate (40%).

6.0 MSC PRINCIPLES AND CRITERIA FOR SUSTAINABLE FISHING

At the centre of the MSC is a set of *Principles and Criteria for Sustainable Fishing* which is used as a standard in a third party, independent and voluntary certification programme. These were developed by means of an extensive, international consultative process through which the views of stakeholders in fisheries were gathered.

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 [1]:

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 favour 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.

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.

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] The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

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.

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.

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.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. 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, artisanal, and fishing-dependent communities shall be addressed as part of this process;

3. 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;

4. 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;

5. incorporates an appropriate mechanism for the resolution of disputes arising within the system[2];

6. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;

7. 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;

8. 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;

9. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;

10. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:

    a) 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;
    b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
    c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;

    d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
    e) establishing no-take zones where appropriate;

11. contain 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.

[2] Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

B. Operational Criteria

The fishing operation shall:

12. 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); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;

13. implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;

14. not use destructive fishing practices such as fishing with poisons or explosives;

15. minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;

16. be conducted in compliance with the fishery management system and all legal and administrative requirements; and

17. 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.

7.0 FISHERY EVALUATION PROCESS

7.1 Certification Process

Pre-Assessment

TAVEL Certification Inc. conducted a pre-assessment evaluation of the Canadian and US commercial offshore Pacific hake (*Merluccius productus*) mid-water trawl fishery in 2006 as required by the MSC program. After review of the pre-assessment, the US client group approached Canada to formally participate in the full assessment of the fishery in the spring of 2007. All aspects of the assessment process were carried out under the management of TAVEL Certification Inc., an accredited MSC certification body, and in direct accordance with MSC requirements (MSC Fisheries Certification Methodology Version 6).

Full Certification Process

In order to ensure a thorough and robust assessment process, and a process in which all interested stakeholders could participate, TAVEL used a number of different tactics to identify stakeholders and encourage their participation

As required by MSC methodology, TAVEL Certification provided opportunities for input at all mandated stages of the assessment process. The general steps followed were:

Team Selection

At this first step of the assessment process, TAVEL issued advisories through direct email, listing on email listservers, and posting on select web sites requesting comment on the nominations of persons capable of providing the expertise needed in the assessment. A final team of 3 scientists was chosen to serve as assessment team members. Team members include Dr. Max Stocker, Dr. Jeremy Collie, and Mr. Mark Pedersen, M.Sc..

Setting Performance Indicators and Scoring Guideposts

As required by the MSC assessment process, the assessment team drafted a set of performance indicators and scoring guideposts (PISGs) to correspond to the MSC Principles and Criteria. The team met in Toronto, ON in August 2007, the PISGs were drafted using the MSC standard (Principles and Criteria for Sustainable Fishing), as well as examples of other performance indicators that had been previously developed for other fisheries including those for the Oregon pink shrimp fishery certification assessment.

These were posted for the required 30 day comment period October 3, 2007 to allow stakeholders to provide comments on the performance indicators. TAVEL specifically requested comments from the environmental and conservation stakeholder community as well as from the client and management agencies.

PISGs for the Pacific Hake fishery were finalized on December 18, 2007. The client submitted written information to the assessment team illustrating the fishery's compliance with the required performance indicators in late May, 2008. To accomplish this activity, the clients contracted a group of consultants to aid in the preparation of that submission. The client provided most of the information needed prior to the actual interviewing process. However, additional information was provided during the assessment and report preparation phases.

As required by MSC methodology, the team met prior to the fishery visit meetings to conduct a meeting to weight the performance indicators.

Meetings with industry, managers, and stakeholders

TAVEL Certification planned for and conducted meetings with stakeholders, industry, fishery managers, and fishery scientists as required. The meetings were held in Vancouver, British Columbia, Canada and Seattle, Washington, USA on the dates of July 7, 8, 9 and 10, 2008 respectively.

Scoring fishery

The assessment team scored the fishery using the required MSC methodology and without input from the client group or stakeholders. The initial scoring session was conducted Seattle, WA on July 10, 2008. There were subsequent scoring discussions held amongst the certification team members after the client provided additional information for some performance indicators.

Drafting Report

The assessment team in collaboration with the TAVEL lead auditor, drafted the report in accordance with MSC required process.

Selection of peer reviewers

As required, TAVEL released an announcement of potential peer reviewers soliciting comment from stakeholders on the merit of the selected reviewers. The nominated peer reviewers were Mr. Tom Jagielo, M.Sc., Mr. Paul Starr, M. Sc. and Dr. Gil Sylvia. No comments were received other than from the client who supported the nomination of the proposed peer reviewers. The selected peer reviewers were Mr. Tom Jagielo and Dr. Gil Sylvia.

Condition Setting

The client and TAVEL Certification reviewed and revised potential certification conditions in late 2008 and early 2009. This process included a review of additional information submitted as clarification of information submitted by the client in June 2008. TAVEL Certification also conducted discussions with the assessment team, agencies and the MSC regarding the potential conditions, the process to be employed in setting conditions and requirements for the client action plan.

The MSC fisheries certification methodology requires that certification bodies consult with relevant entities when setting conditions if conditions are likely to require investment of time or money, or changes to management arrangement or regulations, or re-arrangement of research priorities by these entities, in order to satisfy the certification body that the conditions are both achievable by the certification client and realistic in the time frame specified.

In authorizing the proposed client action plan, TAVEL Certification conducted discussions and confirmed the agency`s acceptance to participate in the proposed client actions. On the US conditions, TAVEL spoke with the PFMC's Groundfish Staff Officer, Mr. John DeVore on March 24, 2009 and attained the PFMC's support regarding their implication with conditions 1, 2, 3, 10, 12 and 14. TAVEL attained similar consent to provide necessary support for Canadian conditions 10, 13 and 15.

Public Comment Periods on Report

The MSC requirements are that the draft report be made available for public comment for a period of no less than 30 days. Under the MSC Certification Methodology (version 6, September 2006) there is a formal requirement that the public comment period be held after the peer review process.

The Public Draft Report was release on April 1 for the mandatory 30 day comment period. Two sets of stakeholder comments were received; one from a group of four environmental/ conservation groups and one from a single environmental/ conservation group. The submitted comments, and relevant responses to concerns raised in those letters can be found in Appendix 2.

Final Report

TAVEL Certification responded to stakeholder comments received during the Public Comment Period and conducted the necessary internal due diligence requirements as specified by the Fishery Certification Methodology. The TAVEL Certification Board met to May 5, 2009 to consider the report of the assessment team, the report of the Peer Review panel and all stakeholder comments. The Determination reached by the Certification Decision Committee was that the Pacific hake mid-water trawl fishery should be certified in accordance with the MSC Standard. The final certification report and determination was posted to the public domain on May 19, 2009 to begin the mandatory 15 day objection period.

Objection Period and Notice of Objection

The 15 day objection period closed on June 10, 2009. Two organizations, Oceana and Monterey Bay Aquarium, filed a notice of objection on June 9, 2009. The notice of objection was subsequently deemed to meet the requirements of the revised MSC Objection Procedure on June 15. In accordance with the Objection Procedure, additional stakeholder input was received from two stakeholder groups (Marine Fish Conservation Network and Greenpeace) and one client group (Pacific Whiting Conservation Cooperative) on July 8, 2009. TAVEL Certification and the Assessment team issued a Reconsideration response to issues raised in the notice of objection and supporting stakeholder submissions on July 15, 2009 and an intent to

proceed to adjudication was issued on August 13, 2009.

Decision of Independent Adjudicator

An adjudication hearing was held on September 14, 15, 2009 in San Francisco. During that time, the Independent Adjudicator heard submissions from the objectors, the client organizations, TAVEL Certification and members of the Assessment Team. The Independent Adjudicator issued a decision of the adjudication process on October 2, 2009. The conclusion of the decision is as follows:

> 68. Subject to the issues raised in this document in relation to performance indicators 1.1.5.1, 2.1.4.2 and 2.1.5.2., I confirm the Final Report and Determination issued by TAVEL Certification Inc. on 19 May 2009.

In response to the Independent Adjudicator decision, TAVEL Certification has made the following revisions to the Public Certification Report;

- Performance Indicator 1.1.5.1 – the original Final Report Scoring Rationale has been revised according to the suggested revision drafted in the July 15, TAVEL Certification Response to Objection.
- Performance Indicator 2.1.4.2 – the original Final Report Scoring Rationale has been revised according to the suggested revision drafted in the July 15, TAVEL Certification Response to Objection.
- Performance Indicator 2.1.5.2 – has been rescored from 90 to 80. The scores in Table 5 and 8 have been adjusted to reflect the revised scores.

The full record of the Objection process and Independent Adjudicator can be seen on the MSC website at http://www.msc.org/track-a-fishery/in-assessment/pacific/pacific-hake-mid-water-trawl/assessment-downloads.

7.2 Other Fisheries in the Area

The west coast waters of Canada and the US are biologically complex, productive areas and as such, there is a complex multitude of diverse fisheries for groundfish, pelagic and invertebrate species in the area of certification. These fisheries fall under a mix of Pacific Fishery Management Council, U.S. federal and state management, U.S. Treaty Tribal management, and DFO management, depending upon the location of the fishery and the requirement for federal management. The MSC process considers other fisheries conducted in an area of a candidate fishery primarily to understand the complexity and interdependence of the various commercial and non-target species, the implications of the coinciding management activities and the potential for interactions between various fisheries. There is a multispecies groundfish trawl and longline fishery in the candidate fishery area. There is spatial and fishing season overlap in the area of certification between groundfish hook and line and trawl sectors. However, the mid-water trawl fishery essentially has no bottom contact.

Currently, there are MSC certifications on-going for salmon species in British Columbia and California, halibut by longline in the DFO Pacific Management area, and albacore tuna in US west coast EEZ waters. There are also MSC certified halibut and sablefish fisheries by longline

in Washington, and certified pink shrimp fishery in Oregon waters.

8.0 FISHERY PERFORMANCE

8.1 Interpretation of the MSC Standard

The MSC Principles and Criteria provide the overall requirements necessary for certifying that a fishery meets the Marine Stewardship Council's environmental standard for being well-managed and sustainable.

The certification methodology adopted by the MSC involves the application and interpretation of the Principles and Criteria to the specific fishery undergoing assessment. This is necessary, as the precise assessment of a fishery will vary with the nature of the species, capture method used etc.

Accordingly, in order to carry out the assessment, the assessment team for the Pacific hake mid-water trawl fishery has developed a structured hierarchy of 'Performance Indicators' and 'Scoring Guideposts', based on the MSC Principles and Criteria. Performance indicators represent separate areas of important information (e.g. Indicator 1.1.1.3 requires a sufficient amount of life history information on the target species and stock, 1.1.2.1 requires information on fishing related mortality and so on). These indicators therefore provide a detailed framework of performance attributes necessary to meet the MSC Criteria in the same way as the Criteria provide the factors necessary to meet each Principle.

Individual 'Scoring Guideposts' (60, 80 and 100) are identified for each performance indicator. It is at this level that the performance of the fishery is measured. It is important to note that the absolute numeric values assigned to each of these guideposts are not intended to reflect any type of percentile scoring system but were established by the MSC to help the assessment teams facilitate weighting and combining different performance indicators.

8.2 Scoring Methodology

For each Performance Indicator, the fishery's management characteristics are compared with the requirements of the pre-specified attributes for each of three Scoring Guideposts (60, 80, 100) to establish a score. A performance score of at least 60 but less than 80 is intended to reflect 'a pass with condition', a score of 80 but less than 100 represents 'pass without condition', while a 100 score reflects 'perfect performance.' In order for a fishery to be certified it must accomplish three things:

- Achieve a score of 60 or greater for every performance indicator
- Each MSC Principle must achieve an aggregated score of 80, or pass without conditions.
- A contractual commitment to performance improvement for each indicator that has a score less than 80.

In fisheries where any given performance indicator scores below 60, a fishery cannot pass the evaluation process and cannot be awarded certification with conditions.

The evaluation framework described above is referred to as the fishery assessment tree. It represents a hierarchical application of the Principles and Criteria. The 60, 80, 100 scoring guideposts used to evaluate a fishery's performance for an indicator are meant to be hierarchical in that to meet a particular score, the scoring guideposts of all lower scores should also have been met.

For any given MSC criterion, sub-criteria and performance indicators are identified as appropriate to the nature of the fishery. All sub-criteria and indicators are weighted indicating their relative importance in setting the overall scores for the fishery.

The process of determining the weights is based on pairwise comparisons within each hierarchy level of the assessment tree below the MSC Principles. Pairwise comparison, as its name suggests, involves assessing the relative importance of pairs of decision criteria in terms of their contribution to their parent criterion in the hierarchy. In all cases, the fundamental question that is asked is which performance aspects are more important in proving the sustainability within that particular level of the tree. The pair wise decisions are entered into the Expert Choice AHP software which subsequently calculates the weight (importance).

Typically, assessment trees are weighted based on the premise that each group of hierarchical levels in the tree are of equal importance. However, upon further reflection, teams often decide that certain performance aspects of the fishery science or management system are more critical in the sustainable operation of the fishery. As such, team will decide that those aspects will receive a higher relative weight in the scoring process.

For example, in this assessment tree, there are six performance indicators which are scored under TAVEL sub-criteria 1.1.1 (adequate knowledge of the target stocks). PIs 1.1.1.1 (adequate knowledge of identify of target species) and 1.1.1.4 (adequate knowledge of the identity of stocks in the management area of the fishery) were considered to be the least important of the six PIs because there are very few opportunities to mix species identity and there is agreement on the stock definitions in the area of the fishery with agreement that the candidate fishery targets only one stock. PIs 1.1.1.2 (life history characteristics of the species/ stock) and PI 1.1.1.3 (spatial distribution of the stock known) were considered of moderate, equal importance because the team considered that there had been significant research done in both these areas over a long time period. PI 1.1.1.5 was considered to be most important at proving the target stock health. Due to the size, variability and harvest pressure on the stock, a statistically valid method for estimating abundance is critical. Finally, the knowledge of environmental influences on the stock dynamics, PI 1.1.1.6, was the second most important indicator as knowledge in this area is critical at separating fishing mortality effects from natural mortality effects.

The fisheries certification 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 6th version, issued September 2006.

8.3 Submission of Data on the Fishery

The MSC certification process is similar to other certification schemes in that the client must provide objective evidence of their compliance with the standard. What is unique about the MSC certification process over a vast number of other certification schemes is the requirement of the independent certification assessors to analyze and evaluate the objective evidence and confirm that the evidence proves that the fishery performance merits a specific score.

As such, clients of the certification process are required to submit evidence to prove that they meet the standard in all areas of the fishery from the status of stocks, to ecosystem impacts, through management processes and procedures. This evidence may take many different forms including internationally peer-reviewed literature, grey literature, working documents of the scientific and management authorities, policy documents, observations on the part of the assessment team, observations and fact presented in written or oral form from direct and indirect stakeholders, etc.

Under the MSC program, it is the responsibility of certification applicants to provide the objective evidence 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.

With aid from the NOAA Northwest Fisheries Science Center personnel at Sand Point, Seattle and Fisheries and Oceans scientific and management personnel in Vancouver, the Pacific hake fishery clients and their contractors provided a very detailed submission to support their application for certification. The document included a foot-noted response and annotated bibliography to each performance indicator. The client and DFO also assisted the assessment team in organizing the fishery assessment visit and arranging meetings with all necessary harvesters, processors, scientists, managers and enforcement officials.

8.4 Performance Evaluations

After completing information reviews and interviews, the assessment team is responsible to use all the information gathered to assess the performance of the fishery. This is done by assigning numerical scores between 0 and 100, using increments of 5 for each performance indicator. The team uses the scoring guideposts to benchmark the performance of the fishery. To practically accomplish the scoring process in a standardize manner between certification bodies, the MSC requires that a decision support software tool, called Expert Choice be used to calculate the scores. 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. Using the software, scores and weights are then combined to get overall scores for each of the three MSC Principles.

As previously mentioned, each certified fishery must have an aggregated weighted score of 80 or above on each of the three MSC Principles. Individual performance indicators receiving a score of less than 80 must have a 'Condition' established that when met, would bring the fishery's performance for that indicator up to the 80 score representing a well-managed fishery.

9.0 TRACKING, TRACING FISH AND FISH PRODUCTS

The specific scope of this full certification assessment is the commercial Pacific hake fisheries conducted by permitted harvesters within the U.S. and Canadian west coast waters. Product traceability was verified to the point of first landing for all fleet sectors. Shore-side vessels deliver product either directly to processing facilities or it is trucked to a processing facility from a nearby wharf. The catcher fleet harvests and delivers to the mothership fleet in U.S. waters or to Joint Venture mothership vessels in Canadian waters. A portion of the harvest conducted by the Makah fishery is delivered to the mothership fleet and to shoreside processors. Catcher/processors harvest and conduct primary processing. The mothership fleet conducts primary (fillet block and minced block) and some secondary processing (production of surimi). Product from both the catcher/ processor and the mothership fleet is often offloaded at cargo offloading facilities.

MSC Chain of Custody requirements were only checked as far as product being landed by legally permitted, Pacific hake fishing vessels with valid fishing licenses/ permits where the landings can be monitored in accordance with state offloading (US) or dockside monitoring (Canada) requirements.

In order for subsequent links in the distribution chain to be able to use the MSC logo, the certified Pacific hake product must enter into a separate chain of custody certification from the point of landing/ transfer forward. The subsequent links must be able to prove that they can track the Pacific hake product back to the permitted vessels which landed the product or to the primary processing facility which initially received the product.

9.1 US Fishery Traceability and Chain of Custody Eligibility

Actual Eligibility Date

The actual eligibility date for entry of certified product into the chain of custody is October 1, 2008.

Traceability within the Fishery

In the US fishery, all mid-water trawl harvesting sectors of Pacific hake have been evaluated in this certification assessment. The only risk of non-certified Pacific hake being caught in the US fishery and introduced into the certified Pacific hake chain of custody is from the limited entry bottom-trawl fishery. Currently, most of the hake that is caught in that fishery is not landed, as the holding time for hake at sea is very short in comparison to other species due to the presence of the protozoan parasite, *Kudoa paniformis.*

There are four sectors which have mid-water trawl Pacific hake allocations including the tribal fishery (Makah) which supplies both the mothership and shoreside sectors; the non-tribal mothership sector, which processes Pacific hake supplied by catcher vessels; the non-tribal catcher/ processor sector, which catches and processes Pacific Hake on board; and the non-tribal shoreside sector, which harvests and delivers Pacific hake to shoreside processing

facilities in Washington, Oregon and California.

All vessels harvesting hake are required to complete and submit fishing logs which identifies the catch location and an estimate of the catch volume. This document effectively proves that Pacific hake caught originates from the certified fishery. At the time of sale, either from catcher vessels to motherships or from shoreside catcher vessels to landside processing facilities, a fish sales slip (a.k.a. fish ticket), is completed identifying, among other things, the vessel, the volume of catch, date of transfer, etc. These documents provide the legal basis for traceability in the fishery and have been deemed to be sufficient for traceability in chain of custody of certified product.

At-sea Processing

At-sea processing is conducted by two sectors in the US fishery, motherships and catcher/ processors. Motherships attain their raw product from catcher vessels via transfer of cod-ends from mid-water trawls to the motherships to empty and process onboard. Catcher/ processors harvest their own raw product and process that product on board.

All motherships and catcher/processors with legal allocation in the US Pacific hake (whiting) fishery are represented by the Pacific Whiting Conservation Cooperative as clients in this fishery certification and have authorization to undertake MSC COC certifications for their on-board operations.

Vessels engaged in either at-sea processing sector are not legally permitted to fish or process fish caught in the Canadian fishery. Therefore, there is no risk of these vessels in the US fishery processing Canadian caught Pacific Hake.

Most motherships and catcher/ processors participate in a number of fisheries including the Alaskan pollock, Pacific cod and yellowfin sole fisheries. Some of these vessels may also act as processors in the Alaskan salmon fisheries. While there is no specific regulation which requires these vessels to offload product when transiting from one fishery to the other, practically, most vessels would be offloaded prior to participating in the Pacific hake fishery. If there were a rare instance that a vessel transited directly from an Alaskan fishery to the Pacific hake fishery, the HACCP and food safety labeling requirements would allow any chain of custody auditor to completely verify the contents of onboard

The risk of mixing Pacific hake product that is processed on-board with other products which might on very rare occasions be on-board is very low. Crews are paid on the basis of catch and yield, so in order to complete a fishing trip and crew contracts, the product needs to be offloaded, which would usually be done prior vessels departing to the Pacific hake fishing grounds. As well, product that is processed on board would be traceable from the final product form, as identified on the master carton, to the processing and catch records.

Point of Landing

There are no restrictions regarding offloading ports on the US west coast as pertains to this fishery certification assessment. Hake is landed in a number of locations on the coast.

Eligibility to enter Chains of Custody

This fishery certification has evaluated the Chain of Custody to the point of first landing at shoreside or transfer at sea. Chain of custody certifications will be required for the mothership, catcher/ processor vessels and shoreside processing operations. Catcher vessels providing raw product to either the mothership sector or shoreside will not require chain of custody certification.

Currently, the processing companies (at-sea or shoreside) named below and on Schedule 1 of the Fishery Certificate are eligible to sell certified Pacific hake.

U.S. catcher-processor vessels and owning companies:

American Dynasty American Triumph Northern Eagle Northern Hawk Northern Jaeger	American Seafoods Company
Alaska Ocean Pacific Glacier	Glacier Fish Company
Island Enterprise Kodiak Enterprise Seattle Enterprise	Trident Seafoods

U.S. mothership vessels and owning companies:

Ocean Rover	American Seafoods Company
Arctic Fjord Arctic Storm	Arctic Storm Management Group
Golden Alaska	Golden Alaska Seafoods
Ocean Phoenix	Premier Pacific Seafoods
Excellence	Supreme Alaska Seafoods

U.S Shoreside vessesls, processing companies and locations:

Vessels

All vessels permitted to participate in the Shoreside hake fishery, inclusive of

vessels in Washington, Oregon and California.

Processing Companies:

All Pacific hake processing companies in Oregon processing Pacific hake legally landed in Oregon; and

The following Pacific hake processing companies processing legally landed Pacific Hake from vessels certified in the MSC Pacific Hake mid-water trawl fisheries:

Trident Seafoods (processing facilities in Washington and Oregon)
Ocean Gold Seafoods, Inc. (processing facilities in Westport, WA).
Washington Crab Producers (processing facilities in Westport, WA)
Bandon Pacific Seafoods (processing facilities in Charleston, OR)
Pacific Coast Seafoods (processing facilities in Warrenton, OR)
Pacific Shrimp Co (processing facilities in Newport, OR).
Pacific Choice Seafood (processing facilities in Eureka, CA).

9.2 Canadian Fishery Traceability and Chain of Custody Eligibility

Actual Eligibility Date

The actual eligibility date for entry of certified product into the chain of custody is October 1, 2008.

Traceability within the Fishery

The Canadian fishery certification is different from the US fishery certification from the perspective that the client is primarily the harvesting sector, as opposed to the processing sector, which is the dominate client group in the US. In the Canadian fishery, this fishery evaluation has assessed the mid-water trawl catcher fleet which includes the fishery certification client, members of the Association of Pacific Hake Fishermen. This fleet delivers to the shoreside processing sector as well as to joint venture (JV) mothership vessels when JV operations are permitted. Currently, access to the Canadian MSC Pacific hake fishery certification is controlled by the APHF. Vessels with access to the MSC certificate, including APHF membership, and other mid-water trawl vessels who negotiate access to the certification through APHF, will be listed in Schedule 1 of the fishery certificate.

There is some risk of non-certified Pacific hake being supplied to Canadian processing companies by vessels not participating in the fishery certification client group led by APHF. Chain of custody certifications will need to specifically focus on the segregation methods used by processors.

All shoreside delivers are required by DFO to be observed and documented by the independent dockside observer program. It is also a requirement of DFO that all delivers made to JV vessels (during years when they are permitted), must be observed by the at-sea observers

posted on the JV vessels.

At-sea Processing

There is no domestic at-sea processing sector in the Canadian fishery. Some vessels provide H&G, frozen at sea product form which is offloaded at shoreside operations..

There are some instances, due to extenuating circumstances, a joint venture fishery may be authorized using foreign contracted JV motherships. In these instances, this fishery certification would be valid to the point of first landing (for shoreside) or transfer (to JV motherships). Any JV vessels processing Pacific hake would be required to reach agreement with the Canadian client, APHF, regarding access to use the MSC certification. Furthermore, any JV mothership vessels would also be required to undergo a chain of custody certification.

Point of Landing

There are no restrictions regarding offloading ports in British Columbia as pertains to this fishery certification assessment. Hake is landed in a number of locations in BC. The only DFO regulatory provision is that 100% of all offloads must be observed by independent dockside monitors.

Eligibility to enter Chains of Custody

The Canadian Pacific hake fishery certification has evaluated the Chain of Custody to the point of first landing at shoreside or transfer at sea. Chain of custody certifications will be required for the JV motherships which are authorized and shoreside processing operations. All catcher vessels of the client group providing Pacific hake product to either the JV motherships or shoreside will not require chain of custody certification.

The Canadian Client, APHF, intends to allow other entities to participate in certificate sharing of this fishery and is currently developing a certificate sharing mechanism.

Currently, the APHF vessels named below and on Schedule 1 of the Fishery Certificate are eligible to sell certified Pacific hake. This list is expected to change.

Canadian vessels:

Ante B	Gulf Spirit	Pacific Banker	Sharlene K
Arctic Ocean	Island Sun	Pacific Fisher	Snow Drift
Blue Waters	Knight Dragon	Point Made	Sun Maiden
Caledonian	Nemesis	Royal Canadian	Tenacious
Canadian No 1	North Isle	Royal Viking	
Carmana	Ocean King	Savage Fisher	
Free Enterprise #1	Osprey No 1	Sea Crest	

10.0 CERTIFICATION RECOMMENDATION

The overall performance of the US and Canadian Pacific offshore Pacific hake fishery is identified in Table 3 below. The Assessment Team has recommended both fisheries for Certification under the MSC program as the following performance criteria have been met:

1. Each MSC Principle has an aggregated, weighted score higher than the required score of 80.
2. No individual performance indicator had a score below 60.
3. The client has agreed to improve the fishery performance for fifteen performance indicators which had scores below 80 and above 60.

Table 3: Final scores allotted to Pacific hake fishery and number of conditions issued.

	US Fishery		Canadian Fishery	
MSC Principle	**Fishery Performance**	**Number of Conditions Issued**	**Fishery Performance**	**Number of Conditions Issued**
Principle 1	84.75	3	84.75	3
Principle 2	83.95	6	84.52	5
Principle 3	88.67	4	89.08	3

The Certification Decision Board of TAVEL Certification has reviewed the report, submitted peer review and stakeholder comments and has confirmed that TAVEL has followed all necessary procedural steps as defined by the MSC Fisheries Certification Methodology.

The Certification Decision Board has determined that the United States and Canadian Pacific hake mid-water trawl fisheries as described within this certification report should be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

After completion of the objection period and final decision of the Independent Adjudicator, TAVEL Certification has determined that the fisheries will be certified in accordance with the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

10.1 Conditions

The fishery attained scores below 80 for the following performance indicators. The client has agreed to improve the performance of the indicators by undertaking the actions identified below each condition.

10.2 Principle 1 Conditions

Condition 1

Performance Indicator 1.1.1.2	Scoring Guidepost 80
Knowledge of the life history characteristics of the species/stocks is adequate to conduct robust assessments.	• There is adequate knowledge of life history characteristics of the target stock to permit estimation of BRPs (Biological Reference Points). • Life history characteristics are directly estimated, monitored and updated periodically.
Condition: A score of 80 or above must be achieved within two years by producing evidence that demonstrates that the life history parameters M and the maturity schedule are periodically updated. [**Condition Intent**: The primary characteristics requiring updating are maturity at age and M. The team is not suggesting that fecundity or histology data be collected.]	
Client Action Plan: Clients will provide a copy of annual stock assessments, which routinely include analysis of biological reference points and life history characteristics such as maturity and M, to the certifier within two years. Clients will commit to re-evaluating maturity at age based on the maturity data collected and will provide a report to the certifier within two years.	

Condition 2

Performance Indicator 1.1.1.6	**Scoring Guidepost 80**
There is adequate knowledge of environmental influences (e.g. upwelling, ENSO regime shifts) on stock dynamics, such that the effects of fishing can be distinguished from natural fluctuations.	• Effects of environmental influences on stock abundance have been studied, and are taken into account in the assessment. • Effects of environmental influences on distribution and availability of fish have been studied and inform the stock assessment process.
Condition: A score of 80 or above must be achieved within three years, by considering results of studies of the effects of environmental influences on hake abundance and distribution and these are considered and taken into account in the assessment, as appropriate. [**Condition Intent**: The team is suggesting that ongoing fisheries and oceanographic studies could be the basis to inform the stock assessment process. As an output, the team is looking for consideration of the environmental influences in the formal stock assessment process and inclusion if appropriate.]	

Client Action Plan: There are a series of fisheries and oceanographic efforts in place that routinely collect data, which is evaluated on an ongoing basis to determine the role of climate and oceanography in regulating the abundance of hake. These studies have been presented in the client submission. Studies have shown that distribution and abundance of hake are related to ocean conditions. To date it is possible to analyze data on ocean conditions and make a gross prediction of year-class distribution and survival. Data is accumulated on an ongoing basis from several sources, and from improved biennial surveys. The clients will provide to certifier within one year formal requests to relevant agencies, and their written acknowledgement of receipt of such request, for retrospective analyses to be performed on the effects of environmental influences on hake abundance and distribution. If it is established that these results are not included but are considered necessary, the clients will lobby PFMC, NMFS and DFO for changes that seek to include such information in the stock assessment process.

Condition 3

Performance Indicator 1.1.4.3	**Scoring Guidepost 80**
The harvest strategy can be shown to be precautionary (including appropriate response to uncertainty).	• The harvest strategy has been demonstrated to be effective and precautionary, based on past management responses.
Condition: The management strategy needs evaluation to test the performance of the 40:10 rule applied to hake, a species with high recruitment variability and uncertain reference points. A report demonstrating that the harvest strategy is effective and precautionary based on past management responses must be prepared within two years.	
Client Action Plan: An evaluation by the SSC of the control rule will be scheduled for the coming assessment cycle. John DeVore, PFMC pers. Comm. to Vidar Wespestad 2/6/08, Seattle WA. See also SSC report on workshops http://www.pcouncil.org/bb/2007/0307/E1c_sup_SSC.pdf. Client will provide certifier with a report from the SSC with the results of this review within two years.	

10.3 Principle 2 Conditions

Condition 4

Performance Indicator 2.1.2.2	**Scoring Guidepost 80**
There is information available on the extent of discard (the proportion of the catch not landed).	• Accurate information is available to allow estimates of discard to be calculated and interpreted.

Condition (US Only): In two years, clients must provide proof that there is adequate monitoring of hake and bycatch discards in all fleet sectors (including catcher vessels delivering to motherships and shoreside processors) and provide a report which calculates and interprets discards. [**Recommendation**: The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors).]
Client Action Plan: Summary information on discards has already been provided to the certifier. Amendment 10 of the PFMC Groundfish FMP has been approved by the PFMC, which will provide comprehensive monitoring to all segments of the fleet. The client will request that the relevant agencies compile annual reports on the frequency of discarding events and estimates of the volume (mass) of fish discarded in each event. Observer data will be used to estimate species composition such that the weight of discarded fish can be estimated by species and accounted for, along with retained harvest amounts. The client will provide the certifier with the above estimates the year following implementation of amendment 10. John DeVore, PFMC personal communication to Vidar Wespestad.

Condition 5

Performance Indicator 2.1.2.3	**Scoring Guidepost 80**
There is information on unobserved fishing mortality (animals injured by the net but not captured; delayed mortality).	• Information from existing work has allowed qualitative estimates of unobserved fishing mortality to be made.
Condition: A score of 80 must be achieved within two years. A report must be provided with qualitative estimates of the frequency of bottom contact, and interactions with seabirds and mammals. [A score higher than 80 can be achieved if some of these interactions can be quantified and/or if it is accepted by the scientific community that significant unobserved mortality does not occur.]	
Client Action Plan: Client will obtain seabird and marine mammal interaction data from NMFS and DFO and provide to certifier within 2 years. Clients will conduct a survey of whiting fishermen to estimate the frequency that whiting trawl nets contact the ocean bottom, both in Canada and the U.S. The clients will process the results of these surveys and forward to the certifier, within 2 years.	

Condition 6

Performance Indicator 2.1.3.3	**Scoring Guidepost 80**
There is information on the nature and extent of operational wastes from the fishery and on the potential ecosystem effects of such wastes. (e.g. Processing slurry, oil, trash, nets, etc…).	• There is knowledge of the type, quantity, and location of operational wastes. • The impact of operational wastes on target and non-target species have been measured.

Condition: The achieve a score of at least 80, a report must be prepared, within two years, on the nature and extent of operational wastes across the sectors of the hake fishery, including documentation of any discharge violations that have occurred. Based on these estimates, an assessment must be made of the potential ecosystem effects of such wastes.

[Condition Intent: Recognizing that the quantity and location of operational waste discharge is known, as required by the current environmental permitting system, the condition is seeking to demonstrate what waste is discharged, quantity and location of operational waste for all fleet sectors. By determining whether there are violations of permits (which are assumed acceptable impact levels), it will be possible to make a statement that waste impacts are within measured limits as demonstrated by the Draft ODCE Seafood GP document (http://yosemite.epa.gov/r10/water.nsf/95537302e2c56cea8825688200708c9a/8fc545b9a2c4c47588256da30065a731/$FILE/Draft_ODCE_Seafood_GP.pdf.]

Client Action Plan: All seafood processors in the Pacific hake fishery are required by state and federal discharge permit regulations to have valid permits, to comply with discharge restrictions specified by these permits, and to report operational wastes on an annual basis. These permits are granted only after the effect of discharges on the marine environment have been evaluated and found to have no "unreasonable degradation of the marine environment." The most recent analysis of the impacts of seafood discharges on the marine environment can be found at (http://yosemite.epa.gov/r10/water.nsf/95537302e2c56cea8825688200708c9a/8fc545b9a2c4c47588256da30065a731/$FILE/Draft_ODCE_Seafood_GP.pdf.] which we have already provided earlier to the certifier. This evaluation is required as a condition for approval of NPDES permits that allow such discharges. The groundfish fisheries and marine environment off the coast of Alaska are not significantly different from that of the Pacific hake fishery; if anything the level of discharges from the Pacific hake fishery is orders of magnitude lower than discharges from seafood processors in groundfish fisheries off the coast of Alaska. We believe this report is sufficient to meet the condition bullet point that says "The impact of operational wastes on target and non-target species have been measured."

Bullet one action plan-Clients will provide to certifier within two years data on the type, quantity and location of operational wastes for all fleet sectors. Clients will also summarize the number of discharge permit violations by seafood processors in the hake fishery, and quantify the amount of discharges, if any, that exceed allowable levels. A report will be delivered to the certifier within four years that has assessed the potential ecosystem effects of discharges from the hake fishery.

Condition 7

Performance Indicator 2.1.4.1	**Scoring Guidepost 80**
Impacts on ecosystem structure and function from the removal of the target species have been assessed.	• Some quantitative information is available on consequences of current levels of removal of target species. • Information suggests that there are no unacceptable fishery impacts on ecosystem structure and function within key fishing areas.

Condition: To achieve a score of 80 or higher, the client must use available data on the consequences of removal of the target species to determine whether there are any unacceptable fishery impacts on ecosystem structure and function within key fishing areas. The milestones are to synthesize the results of existing ecosystem models within 2 years and to assess whether unacceptable fisheries impacts are occurring within 4 years.

[This condition is related to conditions for PIs 2.1.5.1 and 2.2.1.1 below.]

[**Suggestion**: This determination may be based on an ecosystem-based assessment of the hake fishery to include the effects of target and non-target removals on ecosystem function, production and species diversity. The ecosystem-based assessment should incorporate empirical abundance data into appropriate multispecies/ecosystem models, such as Ecopath/Ecosim (Fields et al. 2006) and Atlantis (Brand et al. 2007). The report should quantify the direct and indirect effects of the hake fishery on the principal prey and predator species of Pacific hake. The relevant EIS, NEPA, and equivalent Canadian standards may be used as evidence that the Acceptable Biological Catch of hake does not result in unacceptable impacts on trophic structure or function.

The MSC Fisheries Assessment Methodology section 7.1.12 provides some guidance on determining acceptable and unacceptable ecosystem impacts. Unacceptable impacts are those that cause 'serious or irreversible harm' and/or seriously reduce the ecosystem services. Explicit targets may not be appropriate or available for all ecosystem components, so the scoring guideposts relate to increasing confidence and safety margins with which serious or irreversible harm is avoided.

MSC Fisheries Assessment Methodology 7.1.12

For the Habitat and Ecosystem Components, the concept of 'serious or irreversible harm' refers to change caused by the fishery that fundamentally alters the capacity of the Component to maintain its function or to recover from the impact. This may also be interpreted as seriously reducing the ecosystem services provided by the Component to the fishery, and to other fisheries and human uses. Irreversible harm from fishing includes very slowly reversible harm that is effectively irreversible on time-scales of natural ecological processes (e.g. natural perturbation, recovery and generation times in the absence of fishing, normally one or two decades but may be shorter or longer depending on the species and ecosystem concerned). Examples of serious or irreversible harm include local or global extinction, serious recruitment overfishing, habitat loss on scales that have widespread detrimental consequences for the ecosystem services provided by the habitat (e.g. gross change in species composition of dependent species), and loss of resilience resulting in trophic cascades, fishery mediated regime shifts, etc. Explicit targets may not be appropriate or available for all of the Components, in some cases because there is no scientific or general consensus on appropriate targets. So while performance in relation to targets can be introduced where appropriate, the generic performance requirements SG60 relate to increasing confidence and safety margins with which serious or irreversible harm is avoided, including through the management tools, measures and strategies that are in place.]

Client Action Plan: NMFS and DFO have ongoing programs to develop and monitor ecosystem indicators, based on existing data collection programs, and they routinely analyze and synthesize the results of new data into existing ecosystem models.

Clients will provide a report to certifier within two years that synthesizes the results of existing ecosystem models as they relate specifically to the removal of hake from the ecosystem. A subsequent report will be delivered to the certifier within four years that will include a list of potential ecological impacts (if any), assessments of their magnitude, and a qualitative estimate of the significance of each impact. In the event that unacceptable impacts are established, the clients will lobby PFMC, NMFS and DFO for appropriate change to mitigate these impacts.

Condition 8

Performance Indicator 2.1.5.1	**Scoring Guidepost 80**
Levels of acceptable impact on ecosystem function have been determined and reviewed.	• Levels of acceptable impacts for key components of the ecosystem within main fishing areas have been estimated and are regularly reviewed (e.g. < 10 years).
Condition: To reach a score of 80, client must provide, within two years, evidence that levels of acceptable impacts are estimated and regularly reviewed. This PI should score 80 upon completion of PI 2.1.4.1 above. [Suggestion: Evidence may include a summary of text excerpts from available documents (e.g. a NEPA EIS and analogous Canadian document) that cite specific quantitative or qualitative levels of impact related to hake, and describe thresholds of acceptability. The periodicity of these assessments should also be provided to justify such assessments are done periodically. Refer to MSC FAM 7.1.12 as it provides definition of undesirable, unacceptable impacts for certified fisheries.]	
Client Action Plan: Same as action plan for 2.1.4.1	

Condition 9

Performance Indicator 2.2.1.1	**Scoring Guidepost 80**
The effects of the fishery on biological diversity and productivity have been assessed.	• Effects on biological diversity and productivity within fishing areas are being studied. • Programs are in place to determine acceptable limits of impacts in fishing areas, and these are considered in the fishery management. • Current information does not indicate any unacceptable impacts
Condition: The corrective action is described under PI 2.1.4.1 above. [Suggestion: The first two bullets of the SG 80 are partially met and the third bullet is met. Productivity is well studied, there is far less information on biological diversity. Using existing information and the MSC definition of unacceptable impacts as a starting point, the client should be able to make reasoned arguments about the effects of the fishery on biological diversity.]	
Client Action Plan: Same as action plan for 2.1.4.1	

10.4 Principle 3 Conditions

Condition 10

Performance Indicator 3.6.1	**Scoring Guidepost 80**
The management system has procedures to measure and record and independently evaluates all aspects of the fishery to provide a basis for assessments of stocks and program performance.	• The management system has a comprehensive monitoring program including adequate observer coverage (at-sea personnel/video). • The monitoring program has been subjected to independent outside review to identify gaps. • 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.
Condition (US Only): The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors). Provide a summary report within two years showing how 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. [Suggestion – US – Implement Enforcement Consultant's 2007 report recommendations on electronic monitoring, captured in Amendment 10.] **Condition (Canada Only):** The client must subject the hake fishery monitoring program to an independent, external review to identify any gaps within two years. [Suggestion: - Canada – The objective of the review is to have an impartial, experienced group conduct a review of the fishery monitoring program to confirm that the catch, discards and landings are known so that the stock assessment and management is best informed. This condition could be met by an outside expert department, group or individual with necessary credentials to adequately review the monitoring system. The team could suggest names if requested.]	

Client Action Plan: U.S.-The hake fishery and all groundfish are subject to periodic stock assessment reviews, which includes outside reviewers. The overall stock assessment process is subject to periodic review as well, which includes data collection and monitoring. The 2007 Enforcement Consultants report recommendations on electronic monitoring have been approved by the PFMC and are scheduled for implementation in 2009. Client will work with the Enforcement Consultants to ensure that a summary report is completed outlining how the results of the monitoring program are compiled, analyzed and disseminated to fishery managers. Clients will provide this report to the certifier within two years. Canada- DFO will conduct an impartial review of the fishery monitoring program to confirm that the catch, discards and landings are known, and the stock assessment and management is best informed on the fishery. A panel of experts with expertise in fisheries monitoring system will be convened to examine the precision and accuracy of the current monitoring system and to insure that the program provides adequate catch monitoring. A report summarizing the results of this review will be delivered to the certifier within two years.

Condition 11

Performance Indicator 3.7.2	**Scoring Guidepost 80**
Surveillance and enforcement are in place to ensure that the fishery complies with requirements of the management system.	• Enforcement systems have been implemented and there is control and high compliance with most management measures that affect fishing mortality over the key fishing areas.
Condition: (US Only) The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors). Provide a summary report within two years which demonstrates a high degree of effectiveness.	
Client Action Plan: The Enforcement Consultants recommendations have been adopted by the PFMC under Amendment 10. Client will work with the Enforcement Consultants to ensure that a summary report documenting evidence of a high degree of effectiveness will be completed and provided to certifier within two years.	

Condition 12

Performance Indicator 3.7.3	**Scoring Guidepost 80**
Corrective actions can be applied in the event of non-compliance and there is evidence of their effectiveness.	• There are explicit measures used to address non-compliance in a formal or codified system. • The most commonly applied measures have been tested and found effective.
Condition: (US Only): The US must develop and implement a system to evaluate the effectiveness of corrective measures, within three years. [Suggestion: At the end of each season (if not more frequently), statistics are compiled on the numbers of compliance contacts conducted from various platforms (at-sea, shoreside and aerial), and the number of charges resulting from these contacts, etc. Using this information, staff can evaluate whether enforcement priorities were met and whether various enforcement activities were effective. Overall compliance rates for each area and harvest segment are calculated in order to identify priority areas for enforcement in subsequent seasons.]	
Client Action Plan: The clients will work with NMFS and state enforcement agencies to develop an annual reporting system within three years for the hake fishery such that at the end of each season, statistics will be compiled on the number of compliance contacts conducted from various platforms (at-sea, shoreside and aerial), and the number of charges resulting from these contacts. Using this information, agency staff will evaluate whether enforcement priorities were met and whether various enforcement activities were effective. Overall compliance rates for each area and harvest segment will be calculated in order to identify priority areas for enforcement in subsequent seasons.	

Condition 13

Performance Indicator 3.7.4	**Scoring Guidepost 80**
There is a clear record of enforcement actions (by-catch limits, mesh regulations and closed areas and seasons).	• Formal evidence of violations and corrective actions is available and readily retrievable. • Information is sufficiently detailed to characterize violations.
Condition: (Canada Only): Canada must develop a system, within two years, to provide documentary evidence that there is a clear record of actions and sanctions, and that sufficiently characterizes violations relative to the hake fishery. Once that is addressed, credit can be given for elements under SG 100 that are being addressed. [**Suggestion**: Provide a comprehensive query of the DVS system and provide detailed characterization of the hake fishery violations and disposition of violations (charged, ticketed, court, etc...). For example: The license numbers of all whiting vessels and processors could be run to see if there are any violations have occurred and if so, what were the dispositions of those cases. The team does not need specific information on harvesters (i.e. report does not need to provide identity of the vessels or harvesters).	

Client Action Plan: Within two years DFO will provide a comprehensive query of the DVS system and provide documentary evidence of detailed characterization of the hake fishery violations and disposition of violations (charged, ticketed, court, etc.). Commitment from DFO verified by certifier.

Condition 14

Performance Indicator 3.7.5	**Scoring Guidepost 80**
The fishery is fully compliant with fishing regulations and directives to fishing practices.	• Based on analysis of results from surveillance and monitoring activities, it is concluded that there is overall compliance with fishery regulations that impact fishing mortality, with few exceptions.
Condition: (US Only) A score of 80 or higher will be attainable upon effective implementation of the elements of the Council's Enforcement Consultants 2007 recommendations. A report that documents levels of surveillance and monitoring and presents results of analysis of these activities, including an evaluation of the level of compliance, must be completed within three years.	
Client Action Plan: The PFMC is in the process of implementing the Enforcement Consultants report of 2007. The client will formally petition the PFMC to task the Enforcement Consultants with conducting an analysis of the levels of compliance, to be completed within 3 years.	

Condition 15

Performance Indicator 3.8.2	**Scoring Guidepost 80**
The management system requires a response to outcomes of internal or external reviews.	• The management system has established explicit objective guidelines for responding to internal and external reviews of management performance. • The management system shows evidence of improved performance based on the results of internal and external reviews of management performance.

Condition: (Canada Only): The DFO recently posted a web publication of a new Framework for the management of fisheries resources. The Framework pulls together, in a cohesive package, existing fisheries management policies, and program tools along with new ones, to help establish a more consistent, transparent and results-focused approach to managing fisheries. This will be accomplished with tools for DFO to monitor, self-assess its plans and program delivery, and report on results. SG80 must be met within two years. Canada must provide a summary report of the results of implementation of the Framework as pertains to hake, and its policies and initiatives (stakeholder consultation, data gap analysis, and priority setting), as it relates to explicit objective guidelines for responding to internal and external reviews of management performance in its management system.
Client Action Plan: Within two years DFO will provide a summary report of the results of implementation of the Framework as pertains to hake, and its policies and initiatives (stakeholder consultation, data gap analysis, and priority setting), as it relates to explicit objective guidelines for responding to internal and external reviews of management performance in its management system. Commitment from DFO verified by certifier.

11 ASSESSMENT RESULTS

Tables 4, 5 and 6 provide the scoring summary for each MSC Principle.

Table 7, on page 68 provides an explanation key of the different information fields presented in the Detailed Assessment Results table (Table 7) which starts on page 69.

Table 8, starting on page 66 is a tabular explanation of the assessment team's evaluation of the information it received and the team's interpretation of the information as it pertains to the fishery's compliance with the MSC Principles and Criteria.

Table 4: MSC Principle 1 Scoring Summary

MSC Principle	MSC Criteria	TAVEL Sub-criteria	Number	Performance Indicator	Weight (Same for both fisheries)	US Fishery Score	Canadian Fishery Score
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.	33.3	84.75	84.75
	1.1			The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.	66.7	85.46	85.46
		1.1.1		There is adequate knowledge about the target stocks.	18.2		
			1.1.1.1	There is adequate knowledge of the identity of the target species.	11.7	90	90
			1.1.1.2	Knowledge of the life history characteristics of the species/stocks is adequate to conduct robust assessments.	17.2	75	75
			1.1.1.3	The spatial distribution (i.e., geographic and depth) of the stock(s) is known, including knowledge of seasonal migrations (i.e., adult movement and larval dispersal) within stocks.	17.2	90	90
			1.1.1.4	There is adequate knowledge of the identity of stocks in the management area of the fishery. (All hake stocks in certification area).	11.7	80	80
			1.1.1.5	There is a statistically valid method for estimating abundance, including spatial variability and a statement of uncertainty.	22.1	80	80
			1.1.1.6	There is adequate knowledge of environmental influences (e.g. upwelling, ENSO regime shifts) on stock dynamics, such that the effects of fishing can be distinguished from natural fluctuations.	20.1	70	70
		1.1.2		There is adequate knowledge about the fishery.	18.2		
			1.1.2.1	Fishing effort and catch by area are known.	37.5	90	90
			1.1.2.2	The distribution of size, age and sex ratio (biological parameters) of catches are measured.	37.5	100	100
			1.1.2.3	Fishing methods and patterns on the target stock are well understood and recorded.	25.0	90	90
		1.1.3		There is a robust assessment of the stocks.	18.2		
			1.1.3.1	Assessment models are appropriate to the biology of the stock and the nature of the fishery.	25.0	85	85

	1.1.3.2	Stock assessment methods are statistically rigorous. [Note: This PI evaluates process error]	25.0	95	95
	1.1.3.3	Stock assessment methods take appropriate account of major uncertainties in data and input assumptions. [Note: This PI evaluates measurement error]	25.0	85	85
	1.1.3.4	The stock assessment model provides an adequate estimate of fishing mortality rates over time.	25.0	90	90
1.1.4		There is an adaptive and precautionary harvest strategy to manage the target stocks, including rules for setting catch limits.	18.2		
	1.1.4.1	The rules for setting total allowable catches (TACs) are well defined.	25.0	90	90
	1.1.4.2	The rules include biological reference points for biomass and fishing mortality rate.	25.0	80	80
	1.1.4.3	The harvest strategy can be shown to be precautionary (including appropriate response to uncertainty).	25.0	70	70
	1.1.4.4	The harvest strategy is properly applied.	25.0	80	80
1.1.5		Stocks are not depleted and harvest rates are sustainable. (Scoring Guidance: A score of less than 80 for 1.1.5.1 or 1.1.5.2 results in automatic scoring of P1 Criterion 2 below.)	27.3		
	1.1.5.1	Current stock size is above limit reference point.	50.0	90	90
	1.1.5.2	Current fishing mortality rate is below limit reference point.	50.0	80	80
1.2		Where the exploited populations are depleted, the fisheries 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.		NOT SCORED	NOT SCORED
	1.2.1	There is a well-defined and effective strategy (rebuilding plan) to promote recovery of stocks that become depleted, including rules for setting TACs at low stock sizes that will promote recovery within reasonable time frames.		NOT SCORED	NOT SCORED
1.3		Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.	33.3	83.33	83.3
	1.3.1	The age, sex and genetic structure of the stock are monitored.	33.3	90	90
	1.3.2	Changes in reproductive capacity are not directly attributed to fishery induced changes in the age/sex/ genetic composition of the stock.	66.7	80	80

Table 5: MSC Principle 2 Scoring Summary

MSC Principle	MSC Criteria	TAVEL Sub-critera	Number	Performance Indicator	Weight (Same for both fisheries)	US Fishery Score	Canadian Fishery Score
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.	33.3	83.95	84.52
	2.1			The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to tropic cascades or ecosystem state changes.	42.8	80.6	81.97
		2.1.1		There is adequate understanding of ecosystem factors relevant to the distribution and life history of the target and non-target species.	20.0		
			2.1.1.1	The nature and distribution of habitats relevant to the life-history stages of the target species are known.	33.3	90	90
			2.1.1.2	Information is available on the trophic position and importance of the target species within the food web.	66.7	90	90
		2.1.2		Mortality of non-target species is adequately determined. (Scoring Guidance: A score of less than 80 for 2.1.2.4 results in automatic scoring of P2 Criterion 3 below.)	34.9		
			2.1.2.1	There is information available on the nature and extent of the bycatch (capture of non-target species).	33.3	90	90
			2.1.2.2	There is information available on the extent of discard (the proportion of the catch not landed).	16.7	75	90
			2.1.2.3	There is information on unobserved fishing mortality (animals injured by the net but not captured; delayed mortality).	16.7	70	70
			2.1.2.4	There are assessments of the population status of significant bycatch species and estimates of bycatch mortality.	33.3	70	70
		2.1.3		There is adequate knowledge of the effects of gear-use on habitat, the extent and type of gear losses, and operational wastes.	14.8		
			2.1.3.1	There is adequate knowledge of the physical impacts of fishing gear on habitats, especially essential fish habitat.	25.0	90	90

	2.1.3.2	Gear loss during fishing operations and its effects are known.	25.0	90	90
	2.1.3.3	There is information on the nature and extent of operational wastes from the fishery and on the potential ecosystem effects of such wastes. (e.g. Processing slurry, oil, trash, nets, etc…)	50.0	70	70
2.1.4		Assessments of the fishery regarding impacts on community structure, ecosystem function, on habitats or on the populations of associated species have been conducted.	10.3		
	2.1.4.1	Impacts on ecosystem structure and function from the removal of the target species have been assessed.	75.0	70	70
	2.1.4.2	Impacts on ecosystem structure and function from the removal of non-target species have been assessed.	25.0	80	80
2.1.5		Strategies have been developed within the fisheries management system to address and to reduce any significant negative impacts of the fishery on non-target species and ecosystem function (trophic relationships, community and habitat structure).	20.0		
	2.1.5.1	Levels of acceptable impact on ecosystem function have been determined and reviewed.	31.9	70	70
	2.1.5.2	Management strategies are in place to avoid and/or to reduce ecosystem impacts (i.e. Physical impacts, lost gear, operational waste, effects on ecosystem structure).	22.1	80	80
	2.1.5.3	Management strategies are in place to avoid and/or to reduce bycatch.	46.0	90	95
2.2		The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels, and avoids or minimizes mortality of, or injuries to endangered, threatened, or protected species.	28.6	85.88	85.88
2.2.1		Fishing is conducted in a manner that does not have unacceptable impacts on biological diversity.	25.0		
	2.2.1.1	The effects of the fishery on biological diversity and productivity have been assessed.	100.0	75	75

2.2.2		Fishing is conducted in a manner that does not have unacceptable impacts on	75.0		
	2.2.2.1	There is information on the presence and distributions of listed (rare, threatened, or endangered) or protected species in the main fishing areas.	20.0	90	90
	2.2.2.2	Population sizes and trends of listed or protected species are adequately known, including interactions with the fishery.	20.0	90	90
	2.2.2.3	Trophic (predator-prey) interactions between the target species and listed or protected species have been adequately determined.	10.0	85	85
	2.2.2.4	Permitted take levels for listed (rare, threatened, or endangered) or protected (PET) species have been established.	20.0	90	90
	2.2.2.5	Management strategies are in place to keep the impacts of the fishery on listed and/or protected species within agreed and sustainable limits.	30.0	90	90
2.3		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.	28.6	87	87
2.3.1		There are management measures in place that allow for the rebuilding of depleted populations to specified levels within defined timeframes.	100.0		
	2.3.1.1	There is sufficient information to allow determination of necessary changes in fishery management to allow recovery of depleted populations to specified levels.	40.0	90	90
	2.3.1.2	Management measures are in place for the Pacific hake fishery to allow recovery of depleted populations within specified time frames.	60.0	85	85

Table 6: MSC Principle 3 Scoring Summary

MSC Principle	MSC Criteria	TAVEL Sub-criteria	Number	Performance Indicator	Weight (Same for both fisheries)	US Fishery Score	Canadian Fishery Score
3				The fishery is subject to an effective management system that respects local, national and interjurisdictional laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.	33.3	88.67	89.08
		3.1		The management system has a clearly defined scope capable of achieving MSC Principles 1 and 2 and their associated criteria. This includes short and long-term objectives and associated strategies including those for managing the ecological impacts of fishing, consistent with a well-managed fishery.	15.8		
			3.1.1	All agencies (federal, state, provincial, tribal and interjurisdictional) in the fisheries management system have clear-cut lines of responsibility. Their functions, particularly those involving interactions between these authorities are clearly defined.	18.1	90	90
			3.1.2	The management system contains clear short- and long-term objectives.	37.3	95	95
			3.1.3	The management system takes into account socio-economic impacts in the development of management plans.	18.1	85	100
			3.1.4	Procedures exist for measuring management performance relative to the objectives.	26.5	90	90
		3.2		The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral and explicit basis.	10.5		
			3.2.1	The fishery is managed and conducted in a manner that respects international conventions, treaties, and domestic laws related to the hake fishery.	60.0	95	95
			3.2.2	The fishery is managed and conducted such that state and provincial requirements fit with the federal regulatory standards for the fishery as per the applicable national acts.	40.0	100	90

3.3		The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic and institutional information	10.5		
	3.3.1	The management system solicits and assesses relevant information from all categories of stakeholders.	28.6	100	100
	3.3.2	The management system presents decision makers with clear, useful, and relevant information about policy options and their likely consequences.	42.9	95	95
	3.3.3	The management system provides for timely and fair resolution of disagreements arising within the fishery management system, including any disputes with third parties.	28.6	95	80
3.4		The management system and fishery implements measures and strategies (by rule or by voluntary action of the fishery) that demonstrably reduce by-catch, destructive fishing practices and operational waste.	14.5		
	3.4.1	The management system applies gear restrictions and mandatory practices to minimize bycatch where necessary.	49.8	80	90
	3.4.2	The fishery does not use destructive fishing practices (e.g. poison, explosives).	21.7	100	100
	3.4.3	The fishery minimizes operational wastes such as lost fishing gear, petroleum product leaks or discharges, on-board spoilage of catch, etc.	28.5	90	90
3.5		A research program is conducted to support management needs.	10.5		
	3.5.1	There is a research program that supports management of target species and protection of the ecosystem.	34.9	95	95
	3.5.2	Fishermen assist in the collection of catch, discard and other relevant data.	21.5	95	95
	3.5.3	Relevant research is carried out by the fishing industry and other organizations and is taken into consideration by the management system.	28.4	100	100
	3.5.4	Research results are available to interested parties in a timely fashion.	15.2	100	100

3.6		The management system effectively monitors all relevant performance aspects of the fishery.	12.6		
	3.6.1	The management system has procedures to measure and record and independently evaluates all aspects of the fishery to provide a basis for assessments of stocks and program performance.	100.0	75	75
3.7		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.	15.0		
	3.7.1	Fishery participants are aware of the management system and legal and administrative requirements.	14.3	90	95
	3.7.2	Surveillance and enforcement are in place to ensure that the fishery complies with requirements of the management system.	14.3	75	95
	3.7.3	Corrective actions can be applied in the event of non-compliance and there is evidence of their effectiveness.	14.3	70	90
	3.7.4	There is a clear record of enforcement actions (by-catch limits, mesh regulations and closed areas and seasons).	28.6	85	70
	3.7.5	The fishery is fully compliant with fishing regulations and directives to fishing practices.	28.6	75	95
3.8		The performance of the management system is regularly and candidly evaluated in a systematic fashion and the system responds positively to appropriate recommendations for change.	10.5		
	3.8.1	The management system provides for program evaluation and review	50.0	90	90
	3.8.2	The management system requires a response to outcomes of internal or external reviews.	50.0	95	75

Table 7: Assessment Table Explanation Key

Indicator Number (e.g. 1.1.1.2)	Performance Indicator *(Defined to evaluate conformance of specific aspects of fishery science and management against MSC Standard.)*	• 60 Scoring Guidepost. *(Defined minimum performance score necessary to pass)*	• 80 Scoring Guidepost *(Defined performance score necessary to be certified with no corrective action condition)*	• 100 Scoring Guidepost *(Defined maximum performance score)*
Weight		*Weight assigned by the team to the importance of this indicator*	**Score**	*Score assigned to the indicator by the assessment team (e.g.US=75 CAN=75)*
Client Submission: (*Information provided by the Client to prove conformance of candidate fishery to defined Performance Indicator)* **Scoring Rationale**: *(Rationale developed by assessment team to document and justify score assigned to performance indicator)* **Condition**: [Only applies when score is less than 80] *(Condition of certification developed by the assessment team and assigned to client. Clients must agree through contract to develop and implement an action plan to address conditions in order to be awarded certification with conditions. Conditions must be developed in keeping with the performance requirements and metrics defined in the 80 scoring guidepost. Assessment teams cannot prescribe necessary action but must inform client of the required performance outcome, the time frame to achieve the desired outcome and any specific interim and final reporting requirements)* [**Condition Intent and/or Suggestions:]** *[Assessment teams may provide additional, non-binding guidance to further clarify the purpose of a condition or the intended performance outcome. Teams can also provide non-binding suggestions which may be used by clients to assist in their development of an appropriate Client Action Plan]*				
Client Action Plan: *(Clients must develop an action plan to address the defined condition when any performance indicator scores less than 80. The assessment team must approve the proposed action plan and deliverables prior to clients being awarded Certification*				

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Table 8: Detailed Assessment Results

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.**		
Weight	**33.3**	**Score**	**US=85.02 CAN=85.02**
Weighting Rationale	All MSC Principles are weighted equally as per MSC fisheries certification methodology. Criteria 1 is considered significantly more important than Criteria 3. Criteria 1 provides the critical information to prove high productivity of the stock which is fundamental to proving sustainability of fishery.		

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.*

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.**		
Weight	**66.7**	**Score**	**US=85.86 CAN=85.86**
Weighting Rationale	Sub-criteria 1.1.1 to 1.1.4 are of equal importance. 1.1.5 is slightly more important as it is the final outcome of measurement and management.		

1.1.1 TAVEL Sub-Criterion	There is adequate knowledge about the target stocks.		
Weight	**18.2**	**Score**	
Weighting Rationale	Performance indicators 1.1.1.1 and 1.1.1.4 are of least importance as there are few opportunities to confuse fish identity and there is no indication of stock confusion or overlap. 1.1.1.2 and 1.1.1.3 are considered of equal, moderate importance but of less importance than 1.1.1.5 and 1.1.1.6 because there has been research over a long period of time to inform these issues. 1.1.1.5 is of highest		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
	importance as it provides the most import measure of estimating abundance. 1.1.1.6 is slightly less important than 1.1.1.5 but still very important as knowledge of environmental influence on the stock is necessary in order to distinguish fishing mortality from natural mortality.		

1.1.1.1	There is adequate knowledge of the identity of the target species.	• The target species is occasionally misidentified or misreported.	• The target species is rarely misidentified or misreported.	• The target species is never misidentified or misreported.
Weight		**11.7**	**Score**	**US=90 CAN=90**
Client: Hake schools are targeted and there are few other gadid species taken in combination with hake that could be identified as hake. The only species that it might be confused with is walleye pollock that occasionally co-occur with hake off of Northern Washington and British Columbia. However, observers can readily distinguish the two species. **Scoring Rationale**: A score of 90 is justified because there are few other gadoids found in the directed hake fishery, and the occasional pollock caught with hake are readily identified by observers.				

1.1.1.2	Knowledge of the life history characteristics of the species/stocks is adequate to conduct robust assessments.	• Basic life history characteristics (growth, maturity, fecundity and natural mortality rates) are estimated.	• There is adequate knowledge of life history characteristics of the target stock to permit estimation of BRPs (Biological Reference Points). • Life history characteristics are directly estimated, monitored and updated periodically.	• There is comprehensive knowledge of life history characteristics of the target stock which supports a high degree of confidence in the assessment of the fishery. • Dependence of life history parameters on density, environment and ecologically related species is well understood and taken into account.
Weight		**17.2**	**Score**	**US=75 CAN=75**
Client: Overall, there is comprehensive knowledge of the life-history parameters for Pacific Hake to conduct robust assessments and develop appropriate biological reference points. Biological samples are routinely collected on an annual basis from both domestic and joint venture fisheries in both US and Canada, as well as the fisheries independent surveys. Annual length-weight relationships are established each year for US and Canada and this information has been used in past stock assessment models to convert population numbers to biomass. Changes in growth have been observed in Pacific hake and this information is also incorporated into the most recent assessments using Stock Synthesis 2				

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

(SS2). A fixed maturity-at-age schedule is assumed in the stock assessment model and egg production is assumed to be proportional to spawning stock biomass. Thus, reductions in fecundity associated with reductions in growth are accounted for in the stock assessment model; however, information is limiting on recent trends in maturity-at-age status (Helser and Martell, 2007).

Natural mortality is assumed to be constant and is fixed at 0.23. This value was obtained from a catch-curve analysis of a single cohort tracked over time in a fisheries independent survey (Dorn et al, 1994). Longevity data and previously published estimates of natural mortality for Merluciids in the range of 0.2-0.3 are plausible (Dorn, 1996). Reported biological reference points from SS2 are reported in two forms: 1) those based on parameters estimated in the initial state (e.g., unfished conditions) and, 2) those based on parameter estimates in the most recent year. Management advice is based on most recent estimates of biological parameters.

Scoring Rationale: Adequate knowledge of hake life history characteristics for estimating biological reference points has been demonstrated. However, there is no evidence that the life history parameters M and the maturity schedule are periodically updated. Therefore a score of 75 was given because the requirements of the second bullet point under SG80 have not been met.

Condition: A score of 80 or above must be achieved within two years by producing evidence that demonstrates that the life history parameters M and the maturity schedule are periodically updated.

[**Condition Intent**: The primary characteristics requiring updating are maturity at age and M. The team is not suggesting that fecundity or histology data be collected.]

Client Action Plan: Clients will provide a copy of annual stock assessments, which routinely include analysis of biological reference points and life history characteristics such as maturity and M, to the certifier within two years. Clients will commit to re-evaluating maturity at age based on the maturity data collected and will provide a report to the certifier within two years.

PERFORMANCE INDICATOR		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.1.1.3	The spatial distribution (i.e., geographic and depth) of the stock(s) is known, including knowledge of seasonal migrations (i.e., adult movement and larval dispersal) within stocks.	• Geographic and depth distribution by life history stages have been estimated.	• Geographic and depth distribution by size and age is known, and there is some understanding of the factors that determine that distribution, such as variations in the physical environment. • There is some understanding of ontogenetic migration.	• There have been annual fishery independent surveys defining adult population distribution by age. • Adult and juvenile migrations and other movements are known from specific studies. • Distribution of spawning and nursery areas is known. • Seasonality and duration of larval stage are known.
Weight		**17.2**	**Score**	**US=90 CAN=90**

Client: Knowledge of the spatial distribution and seasonal migration for Pacific Hake is fairly well understood (e.g., Dorn, 1995); however, a complete mechanistic understanding of interannual variability in seasonal distribution cannot be associated with one single environmental variable. Pacific hake have a range that extends from the southern portions of Baja California (winter) to as far north as southeast Alaska (late summer). Typical northward migrations usually extend to the northern portions of Vancouver Island, but have ranged to southeast Alaska on a few occasions. Dorn (1995) study suggests that el Nino events are likely to intensify the spring northward migration of hake and the corresponding distribution of the stock shifts far to the north. Benson et al. (2002) document a shift in the migration patterns of pacific hake during the 1990s and note that hake spawned in Canadian waters and juveniles remained in Canadian waters year round. In addition, there is comprehensive information from commercial log-books on the spatial distribution of fishing effort, thus information from the distribution of the fishing fleet is available to understand more about annual geographic distribution of Pacific hake. Information from the acoustic surveys also provides a temporal snapshot of the distribution of Pacific hake that are at least 2-years and older. Finally, there is also information available on the distribution of juvenile hake from the Pacific Whiting Conservation Cooperative juvenile survey (a coast wide survey) that was initiated in 2001 and from routine larval surveys conducted by the National Marine Fisheries Service (Santa Cruz lab, limited to California waters).

There is a very comprehensive understanding about the vertical distribution of hake in the water column and associations with euphausiids that undergo diel vertical migration (e.g., Mackas et al., 1997; Thomson and Allen, 2000). Euphausiids undergo very strong diel vertical migrations and are generally found along the heads of underwater canyons and along the continental shelf slope. This strong association with euphausiids makes the spatial distribution of pacific hake somewhat predictable based on bathymetry information alone (Mackas et al., 1997).

Ressler et al. (2008) provides a review of distribution and migration for hake. This paper summarizes and references other studies on distribution and migration of juvenile and adult hake. Overall, there is a response of hake to ocean temperature with northward shifts in warm periods and southerly during cold conditions.

The Department of Fisheries and Oceans manages Pacific hake as two stock units; an outside oceanic stock that is transboundary and co-managed with the United States, and an internal stock located in the Strait of Georgia. The Canadian stock assessment process is focused on

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

these two Pacific Hake stocks. DFO scientists are continually investigating genetic and associated biological information to define stock structure to the finest level possible; however, at the current time there is no information that indicates any stock structure different from the 2 stock structure currently used for management.

Scoring Rationale: The 80 SG is met. A score of 90 is justified as there is a wealth of information on the geographic and depth distribution of Pacific hake and very detailed information on the fine scale movements and distribution. Information on juvenile distribution is available from the PWCC juvenile survey. Evidence from the literature indicates that there is some understanding of factors that determine distribution. Seasonality and duration of larval stage are known from studies conducted by NMFS Santa Cruz Laboratory. Analysis of specimen samples for the two stock structures in Canadian waters is currently underway (Ackerman pers. com.).

1.1.1.4	There is adequate knowledge of the identity of stocks in the management area of the fishery. (All hake stocks in certification area).	• The basic stock structure of Pacific hake is understood.	• The identity and distribution of major spawning sites is known. • Stock assessment boundaries correspond with stock boundaries. • Some genetic studies for stock identification have been conducted.	• The identity and distribution of all genetically separate stocks are known.
Weight		**11.7**	**Score**	**US=80 CAN=80**

Client: There are at least two studies that have specifically examined the genetic or biochemical markers of Pacific hake (Utter and Hodgins, 1971; Vrooman and Paloma, 1977). Utter and Hodgins (1971) noted differences in the biochemical markers for hake in coastal waters (Puget Sound and Georgia Strait) and those found in offshore waters. Pacific hake have also been found in low densities in inlets in central British Columbia year round. Vrooman and Paloma (1977) have reported a dwarf species of hake that is dissimilar to Merluccius productus and note that these specimens are only found off the coast of Baja California. Commercial fisheries for Pacific hake generally operate from northern California, Oregon, Washington and southern portions of British Columbia and it is unlikely that these dwarf phenotypes are harvested in the commercial fisheries. Hake fisheries do operate in the Strait of Georgia and available biological information suggests that these stocks are distinctly different than the coastal stock (Alverson and Larkins, 1969). The hake stocks found in the Strait of Georgia are managed separately by the Department of Fisheries and Oceans Canada.

Spawning grounds for coastal hake normally occur off the coast of Baja California and southern California (Alverson and Larkins, 1969), but spawning has also occurred as far north as southern British Columbia (Benson et al., 2002). It is unlikely that hake stocks in Puget sound and Georgia Strait mix with coastal hake stocks. On occasion, the coastal hake stock has failed to show up in the traditional fishing grounds in Canadian waters, and in recent years (2006-07) the bulk of hake landed by Canadian fisheries has been from Queen Charlotte Sound (north of

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Vancouver Island). There is no genetic evidence that points to this being a different stock, and the age-composition information appear to be consistent with the age-compositions from hake landed further south. Therefore, it is most likely that landings from the US and Canadian fisheries are from a single coast wide stock.

Scoring Rationale: 80 SG is met. The identity and distribution of large migratory mass is known. Genetic studies for stock identification have been conducted (Utter and Hodgins, 1971; Vrooman and Paloma, 1977). According to McFarlane's comparative DNA/parasite survey in February 2008 the hake caught in the north (Area 8-11) are from the offshore migratory stock rather than the Gulf stock (McFarlane pers. comm.). This indicates that the stock assessment boundaries correspond with the offshore migratory stock boundaries. The Gulf stock differs genetically from the offshore stock and lack the parasite *Kudoa paniformis*, which causes offshore hake flesh to rapidly degrade (McFarlane and Beamish, 1985).Therefore all three bullets of the 80 SG are met.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.1.1.5	There is a statistically valid method for estimating abundance, including spatial variability and a statement of uncertainty.	• There is a survey that produces an index of abundance for some years.	• There is a periodic fishery – independent survey that establishes a statistically valid index of abundance with corresponding uncertainty measures. • The survey index is stratified over the fished range of hake. • Survey calibration is conducted in some years.	• There is a fishery-independent survey that results in an estimate of the spatial distribution of absolute density each year over the complete range.
Weight		**22.1**	**Score**	**US=80 CAN=80**

Client: Coast-wide fisheries independent surveys for Pacific hake have been conducted every 2-3 years since 1977 (Fleischer et al., 2005). The survey is an integrated acoustic-trawl survey conducted over a series of transects spaced roughly 10 nautical miles apart and run along an east-west direction. The length of each transect is more or less defined by the local bathymetry spanning 50m depth nearshore to 1500m depth off shore and ranges from south of Monterey Bay, California to Dixon Entrance north of the Queen Charlotte islands. The latitudinal range of the survey has varied from year to year, but the general perception is that the survey does span the entire distribution of the stock in any given year. Information from echo-grams is periodically verified using trawl survey information to estimate local densities and age-compositions to calibrate target strength information. This acoustic survey is performed in a very standard method in comparison to other acoustic surveys conducted by NMFS (e.g., Bering sea pollock). This criterion would score at the 80 level because the surveys are conducted on a biannual basis. Calibration of survey equipment is performed in each year of the survey.

A document, Fleischer et al. (2005), is provided to show that there is a biennial acoustic survey that corresponds to international standards of accuracy and precision. The survey instruments are repeatedly checked and calibrated to insure optimal performance. An additional document (Henderson and Horn, 2007) provides detail on the calibration of target strength, sources of error and bias that indicates that the target strength estimates utilized for hake should be considered a very conservative measure.

Scoring Rationale: A score of 80 is justified because there is a periodic fishery independent survey that provides a stratified survey index over the Canadian and US fished range of hake. Uncertainty is reflected in the confidence intervals of the survey indices (Dorn et al. 2008, Fig. 18). Furthermore, details of survey calibration have been provided.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
1.1.1.6	There is adequate knowledge of environmental influences (e.g. upwelling, ENSO regime shifts) on stock dynamics, such that the effects of fishing can be distinguished from natural fluctuations.	• The main environmental influences on stock dynamics have been characterized and considered in the stock assessment process.	• Effects of environmental influences on stock abundance have been studied, and are taken into account in the assessment. • Effects of environmental influences on distribution and availability of fish have been studied and inform the stock assessment process.	• Effects of environmental influences are quantified, well understood and incorporated in the assessments.
Weight		**20.1**	**Score**	**US=70 CAN=70**

Client: There have been several scientific investigations regarding environmental influences on the dynamics of Pacific hake (e.g., Bailey et al., 1982; Benson et al., 2002); these studies have largely focused on how environmental variables affect distribution and correlations between upwelling indices and cohort strength. In general, ENSO events tend to drive the distribution of the stock further north during the summer feeding months due to intensified northward flowing coastal currents. The strength of January upwelling also appears to be related to cohort strength (Bailey et al., 1982), years of strong upwelling result in lower recruitment due to loss of egg/larvae offshore via Ekman transport.

The statistical approach employed in the stock current assessment model (and previous models) does not require time series information on various environmental indices, but the model does capture variation in recruitment that could be attributed to various environmental forces. In other words, there are a number of environmental factors that could influence the dynamics and distribution of Pacific hake, but the assessment model and data collection programs are such that cohort strength is treated as an estimated quantity based on composition information. However, joint management between Canada and US fisheries is of concern with respect to the spatial distribution of Pacific hake, as the current allocation agreement (74% US, 26% CAN) may not permit efficient fishing operations under abnormal seasonal migrations. The intensity of the ENSO events does influence the distribution of Pacific hake and can effect changes in selectivity.

There are efforts to understand environmental effects on hake abundance and recruitment (Ressler et al, 2007). However, from a practical management standpoint the surveys are designed to capture interannual variation in abundance and hake are repeatedly sampled from age 0 to age 2 in order to refine recruitment estimates of individual year-classes. Given that the nominal fishing rate is between 15 to 20 percent it is extremely difficult to separate fishery from the overwhelming environmental effects. Also, making the process of determining effects of fishing and environment is the absence of a spawner-recruit relationship that would help to isolate density dependent effects. A long time series is needed to detect all influences. Studies are underway at NFMS labs in Newport, OR and in Santa Cruz California on interactions between recruitment and environment (Phillips et al. 2007). In the absence of adequate density dependent data and a clear predictable environmental signature management is forced to rely on survey methodology to assess and forecast hake abundance. It should be also be recognized that under the projected warming regime it is possible that existing relationships and stock stationary may be totally lost, so active investigation of responses to ocean conditions may be come more important to develop management under new unforeseen conditions.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Scoring Rationale: The main environmental influences on hake stock dynamics have been studied for over 25 years and have been summarized by Ressler et al. (2007). The effects of environmental influences on stock abundance have been studied, as have the environmental influences on the distribution and availability of hake. The survival of larval Pacific hake is strongly influenced by environmental conditions, with generally lower recruitment in cooler years. Larger (female) hake generally migrate further and they travel further north in warm years. Ressler et al. (2007) concluded that an updated model of these environmental relations is "key to effective monitoring and management of this stock."

Understanding environmental influences on stock dynamics is one of the key components of the ecosystem approach to fisheries management. It is true that improved juvenile surveys provide preliminary estimates of year-class strength that can be used for short-term forecasts of harvest levels. Even so, a stock-recruitment (or stock-production) relationship is required for longer-term projections and for the calculation of biological reference points. Recruitment of Pacific hake is known to be highly variable, yet the overall declining trend in recruitment indicates some relationship with spawning stock biomass (Ressler et al. 2007, Fig. 2). In fact, two of the three assessment methods incorporate a Beverton-Holt stock-recruitment curve.

The steepness of the stock-recruitment curve remains one of the major sources of uncertainty in the hake assessment and the provision of management advice (Martell 2008). If much of the interannual variability in recruitment can be explained by density-independent environmental factors, it should be possible to use the known environment-recruitment relationships to "filter" the recruitment data to obtain a more reliable stock-recruitment relationship (e.g. Zebdi & Collie 1995 Stocker *et a*l 1985). In assessing a stock with a declining trend in abundance, such as Pacific hake, it is critically important to be able to distinguish density-independent environmental effects from the effects of fishing.

Efforts are underway to understand effects of environmental influences on recruitment, distribution, and availability of hake, but there was no evidence provided of how this information has been taken into account in the stock assessment process. Therefore, a score of 70 was given.

Condition: A score of 80 or above must be achieved within three years, by considering results of studies of the effects of environmental influences on hake abundance and distribution and these are considered and taken into account in the assessment, as appropriate.

[**Condition Intent**: The team is suggesting that ongoing fisheries and oceanographic studies could be the basis to inform the stock assessment process. As an output, the team is looking for consideration of the environmental influences in the formal stock assessment process and inclusion if appropriate.]

Client Action Plan There are a series of fisheries and oceanographic efforts in place that routinely collect data, which is evaluated on an ongoing basis to determine the role of climate and oceanography in regulating the abundance of hake. These studies have been presented in the client submission. Studies have shown that distribution and abundance of hake are related to ocean conditions. To date it is possible to analyze data on ocean conditions and make a gross prediction of year-class distribution and survival. Data is accumulated on an ongoing

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

basis from several sources, and from improved biennial surveys.

The clients will provide to certifier within one year formal requests to relevant agencies, and their written acknowledgement of receipt of such request, for retrospective analyses to be performed on the effects of environmental influences on hake abundance and distribution. If it is established that these results are not included but are considered necessary, the clients will lobby PFMC, NMFS and DFO for changes that seek to include such information in the stock assessment process.

1.1.2 TAVEL Sub-Criterion	There is adequate knowledge about the fishery.		
Weight	18.2	**Score**	
Weighting Rationale	PI 1.1.2.1 and 1.1.2.2 are of equal importance and both slightly more important as effort and catch as well biological information on catch are more important that fishing methods and catch pattern (PI 1.1.2.3).		

1.1.2.1	Fishing effort and catch by area are known.	• Accurate estimates of landings are reported by catch area each year. • There is a qualitative estimate of bycatch and discards from key fisheries.	• Catch data are considered adequate to provide reliable information for assessment purposes. • Fishing effort and catches from the target fisheries and significant by-catch fisheries are recorded in logbooks through an at sea observer program with adequate statistical coverage.	• Discards are accurately monitored. • All sources of fishing mortality are measured accurately, including total catch monitoring of vessels targeting on hake and statistically based estimates of hake catch in non-target fisheries.
Weight		**37.5**	**Score**	**US=90 CAN=90**

Client: Observer coverage is discussed in detail under Principal 3. This PI provides information regarding the accuracy of catch data relative to the stock assessment process.

Since 1997 there has been 100% observer coverage for the trawl fisheries in Canada, thus bycatch of Pacific hake is documented for all trawl fishing sectors. All landings are reported via commercial log-books and shore based landings are verified by port sampling programs. Fishing effort information, which is no longer used in the assessment of stock status, is available from log-book information. http://www-sci.pac.dfo-

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

mpo.gc.ca/sa/Commercial/default_e.htm

In the U.S. there are separate monitoring systems for the offshore fisheries and the shoreside fisheries. In the at-sea catcher processor fleet the vessels carry 2 NMFS observers that sample all hauls brought on deck. There are also flow scales which record the total weight of all fish capture in each haul and observers record the species composition. Mother-ships also carry observers that measure and determine the composition of cod ends delivered by catcher vessels. Catch and effort is also recorded in NMFS logbooks. http://www.nwr.noaa.gov/Groundfish-Halibut/Groundfish-Fishery-Management/Whiting-Management/Index.cfm

U.S. shoreside fishery is monitored by the State fisheries agencies and in-season monitoring of the shoreside fishery is coordinated by the Oregon Dept. of Fish and Wildlife Shoreside Hake Observation Program (SHOP) http://www.dfw.state.or.us/MRP/hake. Catch is reported on delivery tickets and species composition is determined by plant workers and/or factory observers. Observer coverage in the shoreside fishery is low, around 10%. The directed shoreside hake fishery is currently required to carry video cameras that observe catch handling. The fishery operates under a permit which allows the vessel to retain all catch in order that accurate estimates of catch and bycatch can be obtained. An amendment to the West Coast Groundfish Plan is undergoing approval that will require higher level of observer coverage on catcher vessels and processing plants.

The U.S. allocates a portion of the quota to Washington tribes that have Treaty fishing rights. At the present time the Makah tribe is the only tribe exercising Tribal fishing rights for hake. Annually about 32,500 mt is available to the tribe for harvest. The harvest quota goes partially to a mothership operation and a shoreside program. In the mothership operation NMFS observers monitor the catch which is reported to NMFS. There is no information on shoreside monitoring.

In Canada catcher-processors and motherships have 100% observer coverage and cameras are required on catcher vessels. In the non-hake fishery the goal is for 10% coverage of catcher vessels, but if a vessel is found to be in violation of regulations then 100% observer coverage is mandated by law.

Scoring Rationale: The documentation provided indicates that all sources of fishing mortality are measured accurately, including total catch monitoring of vessels targeting on hake and statistically based estimates of hake catch in non-target fisheries. The Makah fishery is monitored shoreside by tribal samplers. Discards are not accurately monitored in all fleet sectors. Therefore a score of 90 is justified.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

1.1.2.2	The distribution of size, age and sex ratio (biological parameters) of catches are measured.	• Size distribution from catches has been routinely sampled.	• Data on the biological parameters of catches in the target fishery and fishery independent surveys are available, with adequate sample sizes.	• Comprehensive data on the biological parameters of all catches and from all fishery independent surveys are available.
Weight		**37.5**	**Score**	**US=100 CAN=100**

Client: Comprehensive data length/age compositions are available from the fisheries independent surveys for each year the survey was conducted. This information is routinely used in the stock assessments. Age-composition and age-length keys have been developed each year from both data obtained from commercial catch sampling and fisheries independent surveys.

There have been substantial changes in growth of pacific hake (Helser et al., 2006) which are likely to be related to combinations of cohort density and environmental factors that relate to food abundance and hake distribution. Sample sizes are more than sufficient and the commercial catch sampling is distributed broadly in space and time. Information on female maturity that is used in the stock assessment and to determine annual egg production is based on ova inspected by observers in 1990-1992 (Dorn and Saunders, 1997).

Scoring Rationale: A comprehensive catch sampling program provides data on the biological parameters of all catches. In addition, comprehensive data on length/age compositions are available from the fisheries independent surveys. Therefore a score of 100 is justified.

1.1.2.3	Fishing methods and patterns on the target stock are well understood and recorded.	• Key spatial and temporal fishing patterns are known. • Basic gear configurations used in the fishery are known. • Gear selectivity has not been quantified.	• There is comprehensive knowledge of spatial and temporal patterns of fishing for the major target fishery. • There is comprehensive knowledge of the gear used in the major target fishery. • Gear selectivity has been estimated.	• There is comprehensive knowledge of spatial and temporal patterns of fishing for all fleets targeting hake. • There is comprehensive knowledge of the gear used in all significant fisheries. • The selectivity of the gear are well estimated.
Weight		**25.0**	**Score**	**US=90 CAN=90**

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client: The hake fishery is prosecuted using mid-water trawls that are essentially the same in all fisheries, with the overall size of the net proportional to vessel size and horsepower. Large catcher processors use mid-water trawls (mean trawl opening 90 x 55 m) that are capable of taking up to 150 t, but catch is generally limited to 75 t which matches factory production rates. In the mothership fisheries nets are smaller to facilitate transfer. In the shoreside fishery the vessels are smaller and catching capacity matched to holding capacity. In the Canadian fishery a minimum mesh size of 25 cm is mandatory, but overall selectivity is similar to the US fishery (Helser et al. 2008).

Via commercial log-books there is comprehensive information on the spatial fishing patterns for commercial fleets. All Pacific hake are caught using pelagic trawl gear, and selectivities for these gears are largely determined by the spatial distribution of the stock relative to the spatial distribution of the fishing activities. Larger fish are primarily caught in Canadian waters, as larger hake have a tendency to migrate further north. Estimation of selectivity requires age-composition information and a relative abundance index (Walters and Martell, 2004). Reliably estimating changes in selectivity each year requires independent information on age-composition such as that obtained from fisheries independent surveys that has constant selectivity. Furthermore, estimating dome-shaped selectivity also requires an independent estimate of the instantaneous natural mortality rate M. In the case of Pacific hake, M was estimated using information from the age-compositions in the fisheries independent surveys, and it is also assumed that it is time- and age-invariant.

Studies of gear selectivity have been limited to reducing bycatch, primarily salmon, and most testing has been on Walleye pollock where the same gear is used. In the US mesh size is not specified, but selectivity corresponds to the maturity schedule with large age 2 fish being partially recruited, more age 3 and full gear recruitment around age 4. Nearly all hake are retained by age 5. (Helser et. al. 2008). Older ages are fully selected by the trawl, but appear to be unavailable since larger, older hake are more demersally distributed on the continental shelf. During the 1990s the proportion of demersal hake increased in the bottom trawl survey from 5% or less to 15% of the total biomass, and then decreased as the large year classes spawned in the 1980s died out. This may be an indicator of the amount of older fish in the population and the non-availability in mid-water. Also, in 1998 a vessel with a bottom trawl was used to set on near bottom sign, particularly in shallow water in conjunction with the acoustic survey. This effort found that most of the near bottom sign was large hake (Wilson et. al., 2000).

The combination of fish behavior and mid-water fishing results in a dome shaped selectivity curve. The dome-shaped selectivity has been repeatedly tested and found to be the best fit to the data (Martin Dorn, pers. com.)

Scoring Rationale: A score of 90 has been awarded because there is comprehensive knowledge of the gear used as well as the spatial and temporal pattern of fishing for the fleets. However, in the third bullet of the SG100, estimated gear selectivity is still somewhat uncertain due to inter-annual variation in fish distribution the potential confounding between M and selectivity parameters in the dome-shaped application.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

1.1.3 TAVEL Sub-Criterion	There is a robust assessment of the stocks.		
Weight	**18.2**	**Score**	
Weighting Rationale	All PIs in this sub-criterion are considered to be of equal importance.		

1.1.3.1	Assessment models are appropriate to the biology of the stock and the nature of the fishery.	• There is a generic model which does not account for specific characteristics of either the biology of the species or the nature of the fishery.	• The stock is assessed with a statistical, age structured model, and takes account of all major sources of fishing mortality. • The assessment model incorporates all relevant sources of data including fishery independent surveys on the target stock.	• The assessment model is fully spatially structured, and takes account of all sources of mortality on the target species, including predation mortality.
Weight		**25.0**	**Score**	**US=85 CAN=85**

Client: In recent years the stock assessment model used for Pacific hake is Stock Synthesis II (SS2), written by Richard Methot of the National Marine Fisheries Service (Helser and Martell, 2007; Helser et al., 2008). SS2 is state of the art software that is implemented in the Automatic Differentiation Model Builder Software (ADMB) developed by Otter Research, in 1994. The SS2 implementation for Pacific hake is an age-structured model that jointly estimates the unfished biomass, recruitment deviations and selectivity parameters for separate Canadian and US fisheries thus the model implicitly represents the spatial nature of the fisheries operating in Canadian and US waters. The time series data on relative abundance lack sufficient contrast to resolve the confounding between productivity (i.e., the steepness of the stock recruitment relationship) and the averaged unfished carrying capacity (i.e., the unfished spawning stock biomass). Therefore, information in the form of a prior distribution for the steepness of the stock recruitment relationship is required to resolve confounding in the model structure and data. In addition, the unfished spawning stock biomass is confounded with parameters that describe the descending limb of the selectivity curves in the biomass surveys; therefore, assessment results span a range of fixed parameter values for the descending limb of the selectivity function.

Scoring Rationale: A score of 85 was given for this PI because the assessment model is a statistical age-structured model which accounts for all major soruces of fishing mortality. The model accounts incorporates all sources of information on relative abundance (both adult and juvenile abundance indices) in addition to fisheries dependent information on age-compositions. Additional score above 80 was awarded because the model also accounts for the implicit spatial structure of the population through the use of time varying selectivity curves for both the Canadian and U.S. fishing fleets, but is not fully spatially structured.

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1.1.3.2	Stock assessment methods are statistically rigorous. [Note: This PI evaluates process error].	• The assessment uses generic data fitting procedures. • Uncertainty in the assessment results has been considered qualitatively.	• The assessment uses appropriate statistical methods for fitting models to data. • Uncertainty in the assessment results is quantified.	• The assessment method has been simulation tested and major outputs of management interest are precise and accurate.
Weight		**25.0**	**Score**	**US=95 CAN=95**

Client: SS2 is based on a statistical catch-at-age model and this method has generally been accepted as rigorous method conditional on the information available in the data. As such, a certain amount of subjectivity is required in any assessment model depending on data availability and how much contrast (observations at low and high stock sizes) is available in the time series data. Also there is a certain amount of subjectivity that is required in assigning errors to observation, process, or structural assumptions. There are many examples of simulation testing for statistical catch-at-age models in the literature, and in all of these cases, the general consensus is that the estimators are comprehensive at representing the statistical uncertainty provided that the data are informative about the underlying structural assumptions.

In the case of the Pacific hake, the relative abundance data lack sufficient contrast to jointly estimate key parameters that describe overall population scale (e.g., unfished biomass Bo) and the productivity (e.g., steepness h in the Beverton-Holt stock recruitment function). In previous assessments, it has been necessary to fix these two parameters while estimating other model parameters that describe annual deviations in recruitment, changes in selectivity and changes in growth (e.g., Helser et al., 2006; Helser and Martell, 2007). As a result of fixing the catchability coefficient for the survey (which is nearly equivalent to fixing Bo) and steepness, uncertainty is grossly under-estimated in the current implementation of SS2 on the Pacific Hake (Martell et al., in press). However, in the most recent assessment (Helser et al., 2008) have dramatically addressed this issue by using less informative priors on the steepness of the stock recruitment relationship, directly estimating the survey catchability coefficient, and span a wide range of assumptions about selectivity on the older age classes in the biomass surveys. The overall uncertainty is quantified in great detail and the catch advice is generated by sampling from the full range of uncertainty.

The National Research Council (1998) appointed a panel of experts that reviewed this (and other) methods. The model used for hake has been developed further with features added that account for a number of types of uncertainty. Ianelli and Fournier (1998) present the statistical integrated approach in the NRC review. Also, full Bayesian evaluations (multi-dimensional integration) have been routinely performed to more fully evaluate uncertainty and provide projections useful for the PFMC and NMFS in recommending Acceptable Biological Catches (ABC's).

Scoring Rationale: This PI was given a score of 95 since the assessment method has been simulation tested and major outputs of management interest are precise and as accurate as the available data allow. Uncertainty in current stock size and other stock variables were explored using a Markov Chain Monte Carlo (MCMC) simulation in AD model builder (Helser *et al*, 2008), but there remain concerns about uncertainty estimation.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

1.1.3.3	Stock assessment methods take appropriate account of major uncertainties in data and input assumptions. [Note: This PI evaluates measurement error]	• Major uncertainties in the input data are identified. • Some attempt has been made to evaluate these in the assessment. • There is a moderate degree of confidence in the robustness of the model.	• The assessment takes into account major uncertainties in the data and assumptions. • The most important assumptions have been evaluated; the consequences are known.	• There is a comprehensive evaluation of sensitivities to all significant uncertainties in data and assumptions. • Retrospective patterns in the stock assessment have been identified and minimized.
Weight		**25.0**	**Score**	**US=85 CAN=85**

Client: As stated in PI 1.1.3.2, the relative abundance data lack sufficient contrast to reliably estimate the survey catchability coefficient (q) and the steepness parameter (h) along with all other model parameters. The use of informative priors is necessary to proceed with catch advice and the most recent assessment (Helser et al., 2008) provides a comprehensive analysis of the model sensitivity to these prior assumptions. Also, likelihood profiling has been performed to examine information content in the data and where there is conflicting information relative to the structural assumptions of the model. At present, age-composition information from the Canadian and US fisheries provided conflicting information about the survey catchability coefficient and the final selectivity parameters (Helser et al., 2008); thus the global scaling parameters (e.g., B_0) are sensitive to the weights assigned to the Canadian and U.S. composition information.

Also, there is only a limited amount of time to explore uncertainty during the peer review process (i.e., STAR panel review), in which members of the statistical committee can explore alternative model/data assumptions in response to inquiries from the peer review panel. The major uncertainties have been identified (primarily the data lack sufficient information to estimate all parameters and conflicting information) and there have been numerous attempts to address data/model issues. Absent some experiment designed to make future data more informative (e.g., active adaptive management; Walters, 1986), the continued use of informative priors is necessary for this stock (Martell et al., in press).

Scoring Rationale: A score of 85 was given because the assessments provide sensitivity analysis for the major sources of uncertainty. Informative priors are used to constrain the most uncertain parameters. The consequences of these assumptions on model outputs are known. . Retrospective patterns in the stock assessment have been recognized in Helser et al, 2008 and Martell, 2008.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

1.1.3.4	The stock assessment model provides an adequate estimate of fishing mortality rates over time.	• Fishing mortality rates are estimated each year.	• Age-specific fishing mortality rates from all sources are estimated each year.	• Fishing mortality rates are estimated each year with corresponding estimates of uncertainty.
Weight		**25.0**	**Score**	**US=90 CAN=90**

Client: Fishing mortality rates are estimated each year for both the Canadian and U.S. fishing fleets, and uncertainty in these estimates is reflected in the uncertainty of the biomass estimates. Furthermore, there is a large amount of composition information to reliably estimate the selectivity curves for each fishery and it is possible to calculate age-specific fishing mortality rates from each fleet, but this information is not normally presented in the assessment documents. Trends in fishing mortality rates are reliably estimated due to the copious amount of composition information and a very reliable catch monitoring programs in both Canada and the U.S. The absolute value of fishing mortality rates are less certain due to uncertainty in the global scaling of the population estimates. Also, fishing mortality rates for younger age-classes in the most recent years are less reliable as these age-classes have not fully recruited to the fishery (this is true for all age-structured assessment models).

It should also be noted that the age-at-which fish become fully vulnerable to the fishing gear is at least 2 years older that the age-at-which fish mature. Therefore it is likely that individuals will have had at least two opportunities to spawn before they recruit to the fishery. Estimates of FMSY for this species are very high relative to the historical fishing mortality rates.

The absolute fishing rate can be determined from SS2 by use of the catch-at-age and estimated number-at-age and solving for F via the catch equation. This provides an approximation of F that should be close to actual F, but uncompensated for selectivity.

Instantaneous fishing mortality rates at age and year in that attached spreadsheet were calculated using the standard formula, -ln(Nt/Nt+1)-M, from the estimated stock numbers matrix (also included) generated from Stock Synthesis.

The F-values reported in the spreadsheet (pers. com) are the point estimates from the base model, however SS2 retains the full distribution of uncertainty throughout the search for a global maximum likelihood solution.

Scoring Rationale: Age-specific fishing mortality rates (F) are estimated for each year by two of the three stock assessment models: ADAPT (Sinclair and Grandin 2008) and TINSS (Martell 2008). SS2 does not generate output fishing mortality rates, but they can be calculated *post hoc* by solving the catch equation (Excel spreadsheet “Hake F matrix.xls” provided in the client submission). The 80 SG is met because age-specific F is estimated or can be estimated from model output. Likewise estimates of uncertainty associated with F are estimated presented for the ADAPT and TINSS models. The uncertainty in F is not represented for the SS2 model, though it could be estimated from the likelihood

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

profiles (Helser et al. 2008). The 100 SG is partially met because the uncertainty in F is presented for two of the three models but not the model that was ultimately selected by the STAR Panel for management purposes.

Comparison of the fishing-mortality-rate-by-age tables from the three assessment models reveals substantial uncertainty, which results from the differing assumptions of the assessment models. The ADAPT F values are generally highest, the TINSS intermediate and the SS2 estimates the lowest. Even for ages 6-8, which can be considered fully recruited in the SS2 model, the average F values are lower than the other models. The fact that the most risk-prone model estimates were accepted for management decisions by the STAR Panel, without a full representation of model uncertainty, is cause for concern.

1.1.4 TAVEL Sub-Criterion	There is an adaptive and precautionary harvest strategy to manage the target stocks, including rules for setting catch limits.		
Weight	**18.2**	**Score**	
Weighting Rationale	All PIs in this sub-criterion are considered to be of equal importance.		

1.1.4.1	The rules for setting total allowable catches (TACs) are well defined.	• There is a process for setting TACs but this is not explicitly defined or may vary from year to year.	• An explicit harvest control rule for setting TACs is defined.	• There is a formally agreed management procedure in place that explicitly defines a monitoring strategy, a stock assessment method, and a harvest control rule for regulating catches.
Weight		**25.0**	**Score**	**US=90 CAN=90**

Client: The joint statistical committee that is responsible for assessing the current stock status, determining the reference points and providing a forecast uses the well defined 40:10 harvest control rule. The 40:10 rule as it applies to Pacific hake states that the fishing mortality rate to calculate the annual Acceptable Biological Catch (ABC) is set equal to Fmsy (where F40 is used as a proxy) if the spawning stock biomass is greater than 40% of its estimated unfished state. If the spawning stock biomass is less than or equal to 10% of its unfished state then ABC is set = 0 and no fishery occurs, and if the stock is greater than 10% and less than 40% the ABC is a linear function of the current estimate of SSBt. This rule, however, is slightly modified if in fact the projected spawning stock biomass falls below 25% of its unfished level based on the results on an independent stock-rebuilding simulation model. The ABC estimate from the statistical committee is then passed on to an independent management committee who then determine the optimum yield (OY), which is the official coast wide TAC that is used to further

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partition the annual quota to Canadian and US fisheries based on the allocation agreement between the two nations.

Scoring Rationale: A score of 90 is justified because there is a formally agreed management procedure between Canada and the US in place that specifies a harvest control rule for regulating catches. However, in 2008, three stock assessments with differing assumptions and implications about harvest guidelines were presented to the US-Canada STAR Panel. There is no formally agreed procedure for choosing the stock assessment model and/or integrating the results across models. Therefore, the second criterion of the 100 SG is not met.

1.1.4.2	The rules include biological reference points for biomass and fishing mortality rate.	• The biological reference points are estimated according to generic international standards, but require further refinement to incorporate biological data.	• Maximum fishing mortality rate and minimum biomass thresholds are defined with internationally recognized precautionary reference points for target species. • The reference point calculations incorporate relevant fishery and stock biology data. • The limit reference point for fishing mortality is set at F_{MSY} or its proxy.	• Maximum fishing mortality rate and minimum biomass thresholds are defined with precautionary reference points that take account of impacts on target and associated species.
Weight		**25.0**	**Score**	**US=80 CAN=80**

Client: The biological reference points for Pacific hake are estimated and are conditional on the assumptions previously described in PI 1.1.3.2. The combined effects of steepness (slope at the origin of the stock recruitment relationship) natural mortality, age-at-maturity, and selectivity determine the optimal fishing mortality rate (Fmsy). Natural mortality rates are assumed to be known for Pacific hake, therefore the uncertainty (or criterion that is used to define the precautionary reference point) is under-estimated. The 40:10 harvest rule also requires a reasonable estimate of the unfished biomass (Bo), which is largely determined by estimates of q and the selectivity parameters for the descending limb in the biomass survey. The 40:10 rule is well defined and widely accepted as an appropriate harvest control rule, and the uncertainty is well characterized for the Pacific hake reference points. The most recent assessment does integrate over uncertainty in key parameters that define the harvest control rule. There is no attempt to project fishing mortality rates on associated by catch species; however, in the U.S. bycatch is monitored and the fishery is shut down if the bycatch limits are exceeded.

Scoring Rationale: A score of 80 is justified because precautionary maximum F (F*=0.330, Martell, 2008) and minimum B thresholds ($SB_{40\%}$=1.16 million mt; $SB_{25\%}$=0.72 million mt, Helser et al, 2008) are defined for hake, and their calculations incorporate relevant fishery and biological data. The criterion of setting the limit reference point for F at Fmsy or its proxy is met.

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1.1.4.3	The harvest strategy can be shown to be precautionary (including appropriate response to uncertainty).	• A precautionary harvest strategy has been defined but not evaluated to determine effectiveness.	• The harvest strategy has been demonstrated to be effective and precautionary, based on past management responses.	• The harvest strategy or management procedure has been formally evaluated and demonstrated to meet management targets with acceptable levels of probability.
Weight		**25.0**	**Score**	**US=70 CAN=70**

Client: The harvest rule implemented for the Pacific hake (the 40:10 rule) requires 3 critical pieces of information: 1) an estimate of the unfished spawning stock biomass (SB_0), 2) an estimate of Fmsy or its corresponding proxy, and 3) a projection of the current stock size. The net result of this rule is that reliable estimates of population scale (equivalent to SB_0) and productivity (or steepness of the stock recruitment curve) determine the references points used in the 40:10 rule. As discussed in PI 1.1.3.2, the information to estimate these reference points is insufficient and requires the use of informative priors and therefore the harvest rule is somewhat sensitive to the assumed prior distributions. The 40:10 rule is only precautionary if the relative abundance data are in fact informative about the reference points (Hilborn et al., 2002; Punt, 2003). There have been no studies published in the literature that evaluates the 40:10 rule when the data lack sufficient information to reliably estimate reference points. Although the assessment requires subjective intervention, the uncertainty in the data and prior information is carried right through to the catch advice.

In recent years trends in estimated trends spawning stock biomass for Pacific hake have been declining as the large 1999 year class fades. The Pacific Fishery Management Council has opted in recent years to set the Optimum Yield to values much lower than the recommended ABC, thus there appears to be some other non-quantitative tools for decision making, but these rules are not clearly defined.

Scoring Rationale: The 40:10 rule has not been formally evaluated for a stock such as Pacific hake with high recruitment variability and insufficient information to reliably estimate reference points. The fishery was in the precautionary zone in 1998, 1999, 2000 and 2001. The harvest strategy has not been demonstrated to be precautionary. Management Strategy Evaluation should be used to evaluate the performance of the stock assessment, the 40:10 rule, and their interplay with management decisions (including all important sources of uncertainty: measurement, process, and implementation errors). A score of 70 was given.

Condition: The management strategy needs evaluation to test the performance of the 40:10 rule applied to hake, a species with high recruitment variability and uncertain reference points. A report demonstrating that the harvest strategy is effective and precautionary based on

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past management responses must be prepared within two years.

Client Action Plan: An evaluation by the SSC of the control rule will be scheduled for the coming assessment cycle. John DeVore, PFMC pers. Comm. to Vidar Wespestad 2/6/08, Seattle WA. See also SSC report on workshops http://www.pcouncil.org/bb/2007/0307/E1c_sup_SSC.pdf. Client will provide certifier with a report from the SSC with the results of this review within two years.

1.1.4.4	The harvest strategy is properly applied.	• Key harvest strategy rules are properly applied although the TAC has been exceeded by minor amounts on occasion.	• Harvest strategy rules are implemented with few minor exceptions, which are of no significant consequence to target stock sustainability.	• The harvest strategy is properly applied without exception.
Weight		**25.0**	**Score**	**US=80 CAN=80**

Client: TAC's have not been exceeded since 1999 in Canada and the US. Prior to 1999 there was no formal allocation agreement between the two countries. Canada allows for a 15% discrepancy between the quota and actual catch. The quota may be exceeded but the excess is subtracted from the next years quota and vice versa.

The management system for Pacific hake is a constantly evolving system that incorporated new data, analyses, and harvest policy. The resource has been under US and Canadian jurisdiction and management control since the late 1970s. Over that time span the stock has exhibited increases and decreases and the harvests adjusted accordingly. As can be seen in the stock exploitation history the average exploitation has been well below M, which may be a good proxy for robustness to harvest level. Since 1966 the average annual level of exploitation has been about 6%, and since 1990 has been about 11%. By any measure this is a very conservative level of exploitation. The highest levels of exploitation occurred in the late 1990s following a period of poor survival of hake and other species. The low level of stock was recognized by management and exploitation cut. With a resurgence of the stock the record shows that management was very conservative in increasing harvest rates until biomass increases were quantified in surveys. Under this policy the stock has increased through reduced fishing and improved recruitment.

Scoring Rationale: The documentation indicates that the harvest strategy rules are implemented with few minor exceptions. In case there are minor exceptions they are deemed to not be of significant consequence to the target stock sustainability. Therefore, a score of 80 is justified.

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1.1.5 TAVEL Sub-Criterion	Stocks are not depleted and harvest rates are sustainable. (Scoring Guidance: A score of less than 80 for 1.1.5.1 or 1.1.5.2 results in automatic scoring of P1 Criterion 2 below.)		
Weight	**27.3**	**Score**	
Weighting Rationale	Both PIs in this sub-criterion are considered to be of equal importance.		

1.1.5.1	Current stock size is above limit reference point.	•There is a reasonable chance that the stock is currently above the limit reference point (probability 25 to 50%).	•The stock is being maintained above the limit reference point (probability >50%) and is likely to be around the target reference point currently and in the future.	• The stock has been above the limit reference point in all years. •There is a very high probability that the stock is currently above the limit reference point (>90%).
Weight		**50.0**	**Score**	**US=90 CAN=90**

Client: The limit reference point for Pacific hake is the 25% of the unfished spawning stock biomass ($0.25SB_0$). Based on the most recent stock assessment document (Helser et al., 2008), the current level of depletion in the spawning stock biomass is roughly 37.9% (95% confidence interval of 21.9%-53.9%). The limit reference point is 0.25 and it appears that greater than 95% of the density is above this limit reference point. Spawning biomass estimates in the most recent assessment are estimated to be very near the management objective of 40% of the unfished biomass. Previous low biomass estimates occurred in 2000 and 2001 (Helser and Martell, 2007) in which the stock was at the limit reference point of 25%.

Scoring Rationale: (Scoring Rationale Revised: October 6, 2009) Based on the accepted 2008 stock assessment, there is a high probability that the hake stock is currently above the limit reference point. The median estimate of depletion of the spawning stock biomass is 37%, which is around the target reference point of B40% (Helser et al. 2008). There is a >50% and <90% probability that the spawning stock biomass is above the limit reference point (Martell 2008). None of the three assessment documents in 2008 projected the stock to fall below the limit reference point in 2009 with the 2008 Optimum Yield of 364 kt. However, the stock has been estimated to be at the limit reference point in 2000 and 2001. Therefore, the 100 SG was considered partially met and a score of 90 was awarded.

1.1.5.2	Current fishing mortality rate is below limit reference point.	• There is a reasonable chance that current fishing mortality rates are below the limit reference point	• Current fishing mortality rates are below the limit reference point (probability > 50%).	• There is a very high probability that current fishing mortality rates are below the limit reference point (>90%).

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	(probability 25 – 50%).		
Weight	**50.0**	**Score**	**US=80 CAN=80**

Client: The assessment model for Pacific hake is conditioned on the observed catch from each fishery, thus estimates of fishing mortality rates are subject to the same assumptions as previously described (PI 1.1.3.2). It is difficult to develop a single measure of fishing mortality rates for this fishery because there are two separate fishing fleets, each with their own selectivity curves. Thus fishing mortality is usually summarized as an exploitation rate which is defined as the sum of total catch of each fishery divided by the vulnerable biomass for each fishery. Alternatively, mortality is also summarized through changes in the annual spawning potential ratio and this ratio has been well above the target SPR=40. Trends in fishing mortality rates are likely to be well determined, however, the absolute fishing mortality is relatively uncertain. The most recent estimate of exploitation rate is 18.98% and the target exploitation rate for this stock is 24.6%.

Management is not fixed to a particular rate of fishing. The B40 is a proxy for MSY, and as with other proxies it designed to avoid fishing above the MSY level. The hake assessment cycle is dominated by abundance surveys conducted on a biennial basis, with additional input from age 0 recruitment indices. Thus the annual assessment is strongly influenced by the survey estimated stock size and age composition. In the harvest evaluation process the actual harvest can be set below the B40 level if management is not confident in the assessment indices.

In the review of the 2008 stock assessment the STAR Panel noted that there were several problems with some of the parameters and data used in the stock assessment and concern about the B_{40} reference point and estimates of B_0 . An examination of the harvest control rule and LRP has been called for, and will likely be carried out in the near future.

Scoring Rationale: A score of 80 is justified as the current fishing mortality rates (median F_{2007}=0.223, Martell, 2008:3) are below F_{msy} (F*=0.330, Martell, 2008). Since the F2007 is a median, half the estimates are less than the median of 0.223, therefore greater than 50% of the estimates are below the F_{msy} of 0.33. The probability of F being below F_{msy} is between 50 and 95 % (Martell, 2008).

1.2 - MSC Criterion 2	**Where the exploited populations are depleted, the fisheries 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.**

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Scoring Intent	**The MSC Technical Advisory Board directs that this Criterion is only scored in the instance that the candidate fishery is determined to be in a depleted state hence a recovery plan is already in action. The decision whether the fishery is in a depleted state will be made upon scoring subcriterion 1.1.5 above.**		
Weight		**Score**	**NOT SCORED**
Weighting Rationale	At the time of scoring, the stock has not been declared overfished nor is overfishing occurring. The Criterion and performance indicator were not scored.		

1.2.1	There is a well-defined and effective strategy (rebuilding plan) to promote recovery of stocks that become depleted, including rules for setting TACs at low stock sizes that will promote recovery within reasonable time frames.	• Appropriate rebuilding measures, including reduction in exploitation, exist and are being implemented. • Measures are implemented even if they have not been tested.	• 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.	• 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.
Weight			**Score**	Not scored

Client: At present, the official status of Pacific hake stocks is that they are not over-fished and over-fishing is not occurring. The Pacific Fishery Management Council (PFMC) has adopted the 40:10 harvest control rule, thus target fishing mortality rates are adjusted downwards if the Pacific hake stock falls below 0.4Bo. If the stock falls below 0.25Bo, then the stock is declared over-fished and a rebuilding analysis must be conducted to determine an appropriate recovery time and a fishing strategy that ensures the stock is rebuilt to 0.4Bo within that recovery time. The rebuilding analysis has been defined by the Scientific and Statistical Committee of the PFMC, and these methods have been evaluated quantitatively by Punt (2003).

The current status of the Pacific hake stock is not overfished (Helser and Martell, 2007), therefore this criterion does not apply in the overall scoring.

Scoring Rationale: Not scored: The Assessment team confirmed with the available evidence, and the NOAA Federal Register announcement of May 2008 that the hake fishery is not in a depleted state.

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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.**		
Weight	**33.3**	**Score**	**US=83.3 CAN=83.3**
Weighting Rationale	Potential fishery induced changes to reproductive capacity (PI 1.3.2) were considered to be twice as important as PI 1.3.1 monitoring of stock age, sex, genetic parameters.		

1.3.1	The age, sex and genetic structure of the stock are monitored.	• Determination of population age/sex structure is based on some sampling and verification. • Some genetic information is available on the stock.	• Monitoring of the age and sex structure of the stock is adequate to detect threats to reproductive capacity. • Genetic studies of the stock have been made.	• There is comprehensive monitoring of the age and sex structure of the stock. • The genetic structure of the stock is monitored.
Weight		**33.3**	**Score**	**US=90 CAN=90**

Client: Age and sex composition information are monitored in both the Canadian and US commercial fisheries through catch sampling programs, as well as, through the fisheries independent surveys conducted on a biannual basis (Helser et al., 2006; Helser and Martell, 2007).

Genetic studies of the stock have been made in the past (Utter and Hodgins, 1971; Vrooman and Paloma, 1977) to determine stock structure, and these studies have not been repeated. The catch sampling and fisheries independent survey sampling are adequate to detect threats to reproductive capacity.

Scoring Rationale: Evidence that SG 80 is met is provided. In addition there is comprehensive monitoring of the age and sex structure of the stock through catch sampling programs. Therefore, a score of 90 is justified.

1.3.2	Changes in reproductive capacity are not directly attributed to fishery induced changes in the age/sex/ genetic composition of the stock.	• 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.	• There are likely no downward fishery-induced trends in reproductive capacity of the stock due to changes in the age/sex/genetic structure.	• There is a high degree of confidence that there are no downward fishery-induced trends in reproductive capacity of the stock due to changes in the age/sex/genetic structure.
Weight		**66.7**	**Score**	**US=80 CAN=80**

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Client: Based on the reconstructed spawning stock biomass and estimates of age-1 recruits, there is no obvious reductions in the reproductive capacity, as the spawning stock biomass has remained at healthy levels (SSB > $0.3SSB_0$). There have been substantial changes in growth (a reduction in the mean weight-at-age) during periods of high abundance, and it is suspect that these changes are related to population density (i.e., density-dependent growth), changes in prey availability, or both. Although fecundity is not routinely measured, fecundity is generally proportional to body weight. It is not likely that the fishery has induced changes in growth; recently mean weights-at-age have been increasing as the spawning stock biomass has been reduced by fishing activities, suggesting a density-dependent response in growth.

Scoring Rationale: A score of 80 is justified since there is likely no fishery induced changes in reproductive capacity of the stock.

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.**

Weight	**33.3**	**Score**	**US=83.95 CAN=84.52**
Weighting Rationale	All MSC Principles are weighted equally as per MSC fisheries certification methodology. Principle 2 Criterion 1 is slightly more important as it deals with ecosystem structure and function and potential impacts of the fishery. Criterion 2 (ETP species) and Criterion 3 (depleted species) are of equal importance because they deal with management measures and effectiveness of those measures for the ETP and depleted species.		

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.*

2.1 - MSC P2 Criterion 1	**The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to tropic cascades or ecosystem state changes.**

Weight	**42.8**	**Score**	**US=80.60 CAN=81.97**
Weighting Rationale	Sub-criterion 2.1.2 is most important as accounts for mortality of major species. SC 2.1.1 (hake in the food web) and 2.1.5 (management strategy to control significant negative impacts) are of equal importance and both slightly less importance than 2.1.2. SC 2.1.3 is of lesser importance than previous three because the issues of gear loss, gear use benthic impact and operational wastes are		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
	thought to be of lower importance in this fishery. Of the five sub-criteria, 2.1.4 is of the least importance because it is unlikely that the fishery is having a qualitative impact on the structure and function of the ecosystem.		

2.1.1 TAVEL Sub-Criterion	There is adequate understanding of ecosystem factors relevant to the distribution and life history of the target and non-target species.		
Weight	**20**	**Score**	
Weighting Rationale	PI 2.1.1.2 considered twice as important as PI 2.1.1.1 because of the trophic position of hake and magnitude of the removals. Under 2.1.1.1, hake is a pelagic species, habitat is of lesser importance.		

2.1.1.1	The nature and distribution of habitats relevant to the life-history stages of the target species are known.	• Some habitat information exists but may not be comprehensive or up to date. • The distribution of fishing operations is known and mapped.	• The nature and distribution of all main habitats are known in moderate detail. • Information is recent. • The distribution of fishing operations is monitored.	• The geographic habitat distribution of all life-history stages is known in detail. • The spatial distribution of fishing operations is regularly monitored.
Weight		**33.3**	**Score**	**US=90 CAN=90**

Client: Pacific hake is an important and major component of the pelagic fish community off the west coast of North America. This species occupies an extensive area of the continental shelf and shelf break. The offshore stock ranges from Sanak Island in the western Gulf of Alaska to Magdalena Bay, Baja California Sur. This larger Pacific coast stock makes extensive migrations from the Californias to British Columbia. There are smaller stocks with commensurately smaller ranges: a stock limited to waters off Baja California, a Puget Sound stock, and another of the Strait of Georgia, British Columbia (Bailey *et al,* 1982)[i]. The spatial distribution and concurrent timing of movements of the relevant life-history stages of this species are documented in the literature (Bailey and Francis, 1985; Bailey *et al*, 1982; Dorn, 1995; Saunders and McFarlane, 1997)[ii] and through extensive in-season fishery data, observer coverage, larval surveys, and regular trawl and acoustic surveys of adults and pre-recruits (Helser and Martell, 2007)[iii]. Several studies have also provided information on changes in geographic distribution patterns related to temperature and currents. Climate forcing mechanisms appear to create a dynamic pelagic habitat for Pacific Hake, which in turn changes their distribution (Agostini, 2005; Ware and McFarlane, 1995)[iv]. Pelagic habitat and hake are distributed more extensively toward the north in years when the California undercurrent is stronger and there is a stronger poleward flow off the coast (Field *et al*, 2007).[v].

Scoring Rationale: 80 SG is met. There is evidence of more northerly distributions of Pacific hake starting in the 1990s in response to improved feeding conditions (Benson *et al*. 2002). After 1994 hake spawned in Canadian waters and a portion of the stock remained year-round. The geographic distribution of adult hake is known in detail from the fishery and there is a juvenile survey supported by the US industry. It is not clear that the geographic distribution is known in detail for spawning and larvae and for juvenile hake in Canadian waters. The second bullet of SG 100 is

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

met; the first bullet is partially met, and therefore a score of 90 is justified.

2.1.1.2	Information is available on the trophic position and importance of the target species within the food web.	• Key prey, predators and competitors are known.	• Information is available on the position and general importance of key life stages of the target species in the food web.	• Interactions between all life stages of the target species and other species in the ecosystem have been quantified.
Weight		**66.7**	**Score**	**US=90 CAN=90**

Client: Pacific hake is a mid to upper-trophic level species and the dominant groundfish species off the West Coast. Because of its abundance and trophic position, Pacific hake is both as significant source of food for many predators and a significant predator for many other species of fish and invertebrates. Food web relationships have been well documented and quantified for key life stages of Pacific hake (Cass-Caley, 2003; Field *et al*, 2007, Field *et al*, 2006; Francis, 1982; Grover *et al*, 2002; Livingston, 1983; Livingston and Alton, 1982; Livingston and Bailey, 1985; Rexstad and Pikitch, 1985; Rexstad and Pikitch, 1986; Sumida and Moser, 1980)[vi]. Throughout their juvenile stage, Pacific hake prey on zooplankton including copepod eggs, copepods and euphausiid shrimp. As adults, hake continue to eat euphausiid shrimp along with larger prey such as ocean shrimp (*Pandalus* jordani) and small fish (Gotshall, 1969; Livingston and Bailey, 1985; Rexstad and Pikitch, 1985) [vii].

There is also some evidence for a strong interaction between hake and ocean shrimp (*Pandalus jordani*) (Field *et al*, 2006; Hannah, 1995)[viii]. Pacific hake, in turn, are preyed upon by several fish species, jumbo squid, birds, marine mammals, and man (Field *et al,* 2007 in press; Livingston, 1983; ;NMFS, 2007b)[ix] Pacific hake have a higher production to biomass ratio compared to their predators (Table 1 in Field *et al*, 2006)[x]. Important predators include filter feeding fish, zooplankton including gelatinous zooplankton, rockfish, and sablefish during hake's early life stages, arrowtooth flounder, birds, tuna and lingcod during hake's juvenile life stage, and dogfish sharks and several species of marine mammals and man during their adult stage (Gotshall, 1969; Livingston and Bailey, 1985)[xi]. Recent studies indicate coupling of hake biomass to both prey and predator abundance – model results indicated that pandalid shrimp, rockfish, salmon, seabirds and marine mammals may possibly benefit from increased abundance of forage fish and other prey species when hake abundance is reduced (Agostini, 2005; Field *et al*, 2006)[xii]. A study of 13 surveys off the Canadian coast demonstrated a relationship between increased water temperature and hake abundance, and increased predation on herring stocks (Ware and McFarlane, 1995)[xiii].

Scoring Rationale: The 80 SG is met. A diet matrix for the Northern California Current food web is given by Field et al., 2006, Table 2. According to this table the main prey of hake are euphausids (58%) and forage fish (32%). Juvenile rockfish constitute a small proportion of the hake diet, but because of the magnitude of the hake stock, the predation may be sufficient to prolong the rebuilding of depleted rockfish stocks, particularly canary rockfish (Harvey et al., 2008). This predation effect is similar in magnitude to the effect that rockfish bycatch in the hake fishery has in extending rockfish rebuilding times.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Several predators have Pacific hake as an important component of their prey: dogfish (20%), arrowtooth flounder (50%), Pacific halibut (45%), coastal sharks (25%), toothed whales (15%), sea lions (22%), fur seals (15%). This was not a direct study of diet data, but presumably synthesized the most recent available data. Predator-prey fluxes (i.e. biomass of hake consumed by predators; biomass of prey consumed by hake) are not given by Field et al. (2006), though these fluxes are presumably calculated by the food-web model. Without these fluxes it is impossible to compare the magnitude of predation to fishing mortality, and the trophic interactions cannot be considered fully quantified. The 100 SG is partially met; therefore a score of 90 is justified.

2.1.2 TAVEL Sub-Criterion	Mortality of non-target species is adequately determined. (Scoring Guidance: A score of less than 80 for 2.1.2.4 results in automatic scoring of P2 Criterion 3 below.)		
Weight	**34.9**	**Score**	
Weighting Rationale	Information on nature and extent of bycatch (PI 2.1.2.1) and assessment of population status of significant bycatch species and estimates of their mortality are of equal importance and both these PIs are twice as important as the information on potential discards (PI 2.1.2.2) and unobserved fishing mortality (PI 2.1.2.3).		

2.1.2.1	There is information available on the nature and extent of the bycatch (capture of non-target species).	• The main bycatch (non-target species) have been identified. • Bycatch levels have estimated.	• Quantitative information is available on the capture of non-target species with significant levels of bycatch. • Sample size is adequate to produce statistically valid data.	• Accurate records are kept for all vessels in the fishery on the catch of non-target species of economic or ecological importance, including size information.
Weight		**33.3**	**Score**	**US=90 CAN=90**

Client: The capture and retention of non-target species is well documented through fish tickets and logbooks and through observer programs coastwide for the discarded portion of the non-target species catch (NMFS, 2003a; Saelens and Jesse, 2007; ODFW, 2007)[xiv]. Bycatch levels are very low in the Pacific hake fishery – less than 0.5% of the total catch[xv] in the US. Bycatch is managed to provide incentives for retention and accounting of salmon and overfished groundfish species (Saelens and Jesse, 2007; ODFW, 2007; PFMC and NMFS. 2006b;)[xvi].

Bycatch in the Canadian fishery is also very low and has been decreasing in magnitude annually, averaging about 3% from 2002-2006 (B. Ackerman, pers comm., 2008) [xvii]. Bycatch is monitored through at-sea observer programs and allocated through Individual Vessel Quotas (IVQ) (Ibid)[xviii]. Observer coverage is 100% on at-sea H&G ships and joint venture/foreign fishing fleets. Shore based fleets are subject to a minimum 10% at-sea observer monitoring in the lower west coast Vancouver Island area, where bycatch concerns are minimal. If the incidence of non-target

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

species is observed to be high, then additional at-sea monitoring is prescribed. Shore based fleets are subject to 100% monitoring coverage for fishing trips for shore delivery in locations other than the lower west coast of Vancouver Island. This is a combination of at-sea observers and electronic monitoring (EM). A minimum of 10% at-sea observer coverage is prescribed. EM is 100% coverage. Vessels fishing with only EM must retain all catch (Ackerman, 2008)[xix]. All vessels are subject to 100% dockside monitoring regardless of catch location.

Scoring Rationale: The 80 SG is met. Bycatch rates are low but this is a high-volume fishery that is increasingly limited by rockfish bycatch. As of 2008 a segment of the US fleet did not have observer coverage: US catcher boats delivering to at-sea processors. Some bycatch has not been recorded by shore-side processors (Dana Mathews, NFMS enforcement). A new catch monitoring plan should provide full bycatch records in the US fishery; there is little experience with this plan to date. The electronic monitoring does not provide species or size composition of the bycatch. Thus the 100 SG is partially met, and a score of 90 is justified.

2.1.2.2	There is information available on the extent of discard (the proportion of the catch not landed).	• Information is available on the extent of discarding, including a species list.	• Accurate information is available to allow estimates of discard to be calculated and interpreted.	• Accurate information is available by direct observation on the extent of all discards, and the associated mortality rates.
Weight		**16.7**	**Score**	**US=75, CAN=90**

Client: In the US, accurate information is available to allow estimates of discard to be calculated and interpreted through the West Coast Groundfish Observer Program (NMFS 2003a)[xx]. Bycatch is managed to provide incentives for retention and accounting of salmon and overfished groundfish species (Ibid)[xxi] such that bycatch, including discard, is a very small proportion of the overall catch in the Pacific hake fishery. Mortality rates of the total bycatch (discard plus retained catch) of key species of non-target groundfish have been estimated and are tracked within the fishing season with a fishery sector scorecard (Devore, 2007b; PFMC and NMFS, 2006b)[xxii]. The scorecard is adjusted several times during the fishing season and updates are provided through PacFIN's Quota Season Monitoring (QSM) reports used by the Pacific Fishery Management Council and National Marine Fisheries Service to track mortality (Devore, 2007b)[xxiii]. Total bycatch mortality of all non-target species of groundfish in the Pacific hake fishery across all sectors is less than 0.5% (based on Saelens and Jesse, 2007 and Devore, 2007a)[xxiv]. Bycatch rates of overfished groundfish species in the US and Canada have been falling. In the US, bycatch mortality of important overfished rockfish species is low (< 100 t), compared with an annual hake harvest of over 250,000 t (Devore, 2007b)[xxv].

Bycatch rates in the Canadian fishery are also very low and discards (See 2.1.2.1 above) almost non-existent. About 8% of the non-target species bycatch is released as discard and virtually all of the hake is retained (based on 2002 – 2006 data, Ackerman, 2007)[xxvi]. Non-target species of groundfish are covered by IVQ and are managed within the Integrated Fisheries Management Plan (IFMP) and may not be exceeded without penalties or acquiring additional coverage. Primary bycatch species include Pollock, dogfish, and yellowtail rockfish. Meal plants are used on shore to render fish offal into fish meal and oil (Ibid)[xxvii]. Some of the landed bycatch is also sold.

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Scoring Rationale: Discarding refers to target and non-target species that that are caught by the net and released back to the sea, either before or after being brought on board the fishing vessel. Operational discards occur when a fishing boat overfills its net or when and undesirable species mix is caught. Regulatory discards involve the release of fish species that are not allowed to be retained by management measures, such as in the US Fishery Management Plans. In a high-volume trawl fishery discarded fish are assumed to suffer 100% mortality. The list of discarded species can be assumed to be the same as the list of target and bycatch species (e.g. Agenda Item F.3.a from the 2008 STAR Panel). Thus the 60 SG is met. In the US there is qualitative information about the frequency of discarding, for example during the transfer of cod ends from catcher boats to processors. Discard events are categorized as a little, some, a lot (Steve Friese, NMFS Permitting). There was one well-publicized occurrence of dumping of catch because of high bycatch. A small segment of the fleet is responsible for discarding and efforts are underway to minimize such occurrences. In the US fishery, operational discards have been dropping. Attempts are being made to include the discards in TAC and bycatch limits. Shore-based boats that discard more than two baskets are expected to terminate the trip (Dana Mathews, NMFS Enforcement). The 80 SG is not met because there are not accurate estimates of the quantity of discards, particularly by catcher boats.

All segments of the Canadian fishery have observer coverage from 10% minimum on catcher vessels to 100% observer coverage on JV vessels which are receiving fish from catcher vessels. The 80 SG is met for the Canadian fishery as discard rates can be estimated. The fleet is IFQ andmust land all fish where 100% of landed product is monitored dockside by independent, contracted monitors. In most years, the majority of product is landed shoreside and bycatch can be monitored directly.

Condition (US Only): In two years, clients must provide proof that there is adequate monitoring of hake and bycatch discards in all fleet sectors (including catcher vessels delivering to motherships and shoreside processors) and provide a report which calculates and interprets discards.

[**Recommendation**: The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors).]

Client Action Plan: Summary information on discards has already been provided to the certifier. Amendment 10 of the PFMC Groundfish FMP has been approved by the PFMC, which will provide comprehensive monitoring to all segments of the fleet.

The client will request that the relevant agencies compile annual reports on the frequency of discarding events and estimates of the volume (mass) of fish discarded in each event. Observer data will be used to estimate species composition such that the weight of discarded fish can be estimated by species and accounted for, along with retained harvest amounts.

The client will provide the certifier with the above estimates the year following implementation of amendment 10. John DeVore, PFMC personal communication to Vidar Wespestad.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.1.2.3	There is information on unobserved fishing mortality (animals injured by the net but not captured; delayed mortality).	• Areas of potential unobserved fishing mortality are identified but no further information is available.	• Information from existing work has allowed qualitative estimates of unobserved fishing mortality to be made.	• 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).
Weight		**16.7**	**Score**	**US=70 CAN=70**

Client: The nets employed in the fishery have very large mesh in the portion of the net that may come in contact with the bottom; the net is weighted with a light chain foot rope, which is the only portion that may come in contact with the bottom if hake are fished near bottom. If the net is in close contact to the bottom it can only be done over the very soft bottom of the outer shelf where there is limited bottom fauna. In areas of hard bottom, where most epifauna are found, the net would seize and the bottom of the forward portion of the net will be destroyed.

For the level of takes of seabirds and marine mammals, we can obtain estimates of absolute frequency in the at-sea fishery and observations from the shoreside fleet. Seabird interaction has been shown to occur infrequently and not considered a significant source of mortality (WA Seagrant, Ed Melvin), nor are marine mammals, which are rarely taken, if at all. A report on these takes can be provided within the next year.

Scoring Rationale: This PI requires areas of potential unobserved fishing mortality first be identified and then discounted if not important. It does not relate to observer coverage per se, but to animals injured by the net but not captured. Potential sources of unobserved fishing mortality in the hake fishery include contact with the sea floor, animals injured by the trawl doors, marine mammal and seabird strikes by the trawl warps. The client did not provide specific information about unobserved fishing mortality in its original submission, except the Sea Grant Report (2006) that described preliminary seabird whiting trawl interaction, which showed some mortality. The assessment team did not find any significant sources of unobserved fishing mortality. The 60 SG is met, and because some information is available, a score of 70 is justified. More recent information provided by the client suggests that a report on unobserved mortality could be provided within one year.

Condition: A score of 80 must be achieved within two years. A report must be provided with qualitative estimates of the frequency of bottom contact, and interactions with seabirds and mammals.

[A score higher than 80 can be achieved if some of these interactions can be quantified and/or if it is accepted by the scientific community that significant unobserved mortality does not occur.]

Client Action Plan: Client will obtain seabird and marine mammal interaction data from NMFS and DFO and provide to certifier within 2 years. Clients will conduct a survey of whiting fishermen to estimate the frequency that whiting trawl nets contact the ocean bottom, both in Canada and the U.S. The clients will process the results of these surveys and forward to the certifier, within 2 years.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.1.2.4	There are assessments of the population status of significant bycatch species and estimates of bycatch mortality.	• Trends in the abundance of the main bycatch species are known. • Populations of the main bycatch species are depleted but not beyond the level at which they would face a risk of irreversible harm from the target fishery.	• Regular population assessments are made for the main bycatch species. • Populations of the main bycatch species are not depleted.	• Population assessments are made for all significant bycatch species, including the mortality caused by the target species fishery.
Weight		**33.3**	**Score**	**US=70 CAN=70**

Scoring Intent: Scoring of this Performance indicator determines whether PIs under MSC Principle 2, Criteria 3 (Depleted species) must be scored. A score of less than 80 on this performance indicator, based on whether main bycatch species are depleted, will trigger scoring of P2C3 performance indicators.

Client: Most of the significant non-target species caught in the Pacific hake fishery are groundfish and salmon (primarily Chinook salmon). Significant key groundfish species include widow rockfish and yellowtail rockfish. Another overfished groundfish species, canary rockfish, is caught in small amounts in the Pacific hake fishery. Stock assessments have been completed for all of these species. Widow rockfish and canary rockfish are overfished species and catches in the Pacific hake fishery are carefully managed under a rebuilding plan using intersector allocations and the aforementioned scorecard (Devore, 2007b) [xxviii]. Stock assessments have not been conducted on all species of groundfish, however the National Marine Fisheries Service conducts trawl surveys off Washington, Oregon, and California on an annual basis. Declines in abundance of non-target species caught in the Pacific hake fishery that might signal a problem would likely be detected by these surveys. Bycatch is managed to provide incentives for retention and accounting of salmon and overfished groundfish species (Saelens and Jesse, 2007) [xxix]. Salmon stock assessments and recovery requirements of listed species require bycatch caps and area closures if the bycatch of salmon is anticipated to exceed the cap before the end of the Pacific hake season (NMFS, 2007a) [xxx]. Bycatch is monitored through 100% observer coverage aboard at-sea catcher processor vessels and motherships by the West Coast Groundfish Observer Program (Saelens and Jesse, 2007); Tuttle and Donovon, 2007)[xxxi] and through a shoreside monitoring program which samples catch and bycatch which is brought to shore and sorted[xxxii]. A bycatch scorecard is maintained by the Groundfish Management Team (GMT) for protected species under rebuilding plans (PFMC and NMFS, 2006b)[xxxiii]. Regulations in the Pacific groundfish fishery, including the mid-water trawl fishery for Pacific hake, are adjusted several times in-season to ensure compliance with bycatch goals for each fishery sector.

Pollock, dogfish shark, and yellowtail rockfish, which are the primary bycatch species in the Canadian hake fishery - most have stock assessments and mortality estimates (see Appendix C, PCGFMP, NMFS 2006)[xxxiv]. As mentioned above in section 2.1.2.1 and 2.1.2.2, Canada has an extensive observer program coupled with an IVQ system with individual bycatch caps or allowances. Thus, individual vessel operators are accountable for maintaining and not exceeding IVQ coverage. Bocaccio, a depleted stock, must now be relinquished. All retained bocaccio bycatch must be brought in and payment for the catch must be submitted to the CGRCS for Science.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Scoring Rationale: The 60 SG is met. The first bullet of the 80 SG is met in that regular assessments are made of the main bycatch species. The second bullet is not met because widow, canary, and darkblotched rockfish are overfished species, and therefore a score of 70 is justified. There are also depleted stocks of Chinook salmon that are not considered listed or protected under (2.2.2).

Scoring Guidance: PI 2.1.2.4 scored <80, as such performance indicators defined for Principle 2, Criterion 3 below must be scored.

2.1.3 TAVEL Sub-Criterion	There is adequate knowledge of the effects of gear-use on habitat, the extent and type of gear losses, and operational wastes.		
Weight	**14.8**	**Score**	
Weighting Rationale	PI 2.1.3.3 is twice as important as the other two PIs (which are of equal importance). The fishery is a high volume fishery and operational wastes are potentially very important in comparison to potential gear loss PI 2.1.3.2) and fishing gear physical impacts PI 2.1.3.1).		

2.1.3.1	There is adequate knowledge of the physical impacts of fishing gear on habitats, especially essential fish habitat.	• Main impacts of gear use on the habitat are identified including extent and location of impact. • Effects of habitat perturbations are estimated and appear stable under current levels.	• Impacts of gear use on the habitat are identified, including extent and location of use. • There are no unacceptable impacts on habitat.	• There is detailed knowledge of the types of gear used in the fishery. • Fishing effort is quantified by gear type. • The physical impacts on the habitat due to use of gear have been studied and quantified.
Weight		**25.0**	**Score**	**US=90 CAN=90**

Client: General trawl impacts on estuarine, shelf and slope habitats have been described and analyzed for the Pacific Fishery Management Council (PFMC) and National Marine Fisheries Service (NMFS) as a part of the environmental impact statement (EIS) for designating essential fish habitat for groundfish[xxxv]. Mid-water or pelagic trawl gear is required for the directed hake fishery and mid-water trawl gear components only make bottom contact infrequently (NMFS, 2005) [xxxvi]. National Marine Fisheries Service has established several no-trawl areas to protect essential fish habitat for groundfish but these do not apply to mid-water trawl gears. The PFMC and NMFS did not feel it was necessary to exclude mid-water trawling to protect essential fish habitat and very little of the known hake grounds have set aside for that purpose (Ibid)[xxxvii]. Similarly, in Canada DFO permits mid-water trawling in 164 Rockfish Conservation Areas because mid water trawling has negligible impact on benthic rockfish species and their habitat that the RCAs are intended to protect. Chapter 3 of the Pacific Coast Groundfish Essential Fish

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Habitat EIS conducted no analysis of sensitivity to water column habitats where Pacific hake are harvested as it was assumed that any such effects of gear were minimal and temporary (Ibid)[xxxviii].

In Canada, DFO and industry have created several coral, sponge reef, and tideline area closures. In Canada, DFO consults extensively with the groundfish industry on the management of the fishery. DFO takes into consideration this advice when implementing the many year round and seasonal closures (i.e. for the protection of sponge reefs, spawning aggregations, reduce bycatch and conflicts with other gears).

Scoring Rationale: The 80 SG is met in that this is a mid-water trawl fishery with infrequent bottom contact. In the pelagic zone, there is very little impact on habitat structure. Again, the client submission dealt mainly with bycatch. It is unclear to what extent the Canadian area closures affect the hake fishery and whether mid-water trawling is prohibited in these areas. Because large hake tend to aggregate at depth, there is an incentive to fish near the bottom. The first two bullets of the 100 SG are met therefore a score of 90 is justified.

2.1.3.2	Gear loss during fishing operations and its effects are known.	• Some recording of gear losses takes place. • Qualitative estimates are available for the effects of lost fishing gear, and loss is below unacceptable levels.	• There is knowledge of the type, quantity, and location of gear lost during fishing operations.	• There is detailed knowledge of the type, quantity and location of gear types lost during fishing operations. • The impact of gear loss on target and non-target species has been measured, and shown to have negligible effects.
Weight		**25.0**	**Score**	**US=90 CAN=90**

Client: The Pacific hake fishery is prosecuted in the continental shelf and shelf break over sand/mud habitats with pelagic trawls. The hake grounds are generally flat or sloping bottom types without rocky outcroppings that might snag a net. Hake are caught off bottom with pelagic trawls, so bottom contact with fishing gear is minimal. In addition, Oregon State University's Marine Extension Program has made available a 'snag book' for trawlers to help them avoid sunken vessels or other objects that might result net entanglement. DFO notifies industry by issuing a Notice to Industry accessible to the public and on the DFO website. In addition, DFO discusses and distributes details with the Groundfish Trawl Advisory Committee (GTAC) any new "addition" to the habitat, i.e. sunken vessels, cables, seismic equipment etc. To our knowledge, there has not been a mid-water trawl net permanently lost in over 20 years (Wespestad, 2007)[xxxix]. Industry representatives indicate that while nets occasionally get snagged or torn, all are recovered.

Scoring Rationale: The 80 SG is met. The assessment team heard testimony that gear losses are recorded in log books; vessels would record the location in order to try to retrieve the gear. Such detailed information would satisfy the first bullet of the 100 SG. In Canada there have been two incidents of gear loss; none since 2000 (Alan Sinclair, DFO).

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.1.3.3	There is information on the nature and extent of operational wastes from the fishery and on the potential ecosystem effects of such wastes. (e.g. Processing slurry, oil, trash, nets, etc…)	• Operational wastes are measured and recorded. • Qualitative estimates are available for the effects of operational wastes.	• There is knowledge of the type, quantity, and location of operational wastes. • The impact of operational wastes on target and non-target species have been measured.	• There is detailed knowledge of the type, quantity and location of operational wastes from fishing.
Weight		**50.0**	**Score**	**US=70 CAN=70**

Client: Regulations in both Canada and the U.S. prohibit the discharge or dumping of anything other than fish processing waste. All other material must be logged, retained and documented to be properly disposed. At-sea, this is monitored by the Coast Guard, and in Canada, also by the B.C. Dept. of Environment. In addition to fishery restrictions, there are numerous laws and regulations enforced by the U.S. Coast Guard regarding preventing oil spills, prohibitions on disposing of plastics and other materials, etc. The U.S. is 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 (US EPA, and US Coast Guard websites) [xl].

In the U.S., a National Pollutant Discharge Elimination System (NPDES) permit is required for all vessels, and all discharges must be logged and a report of all discharges must be submitted annually (http://cfpub.epa.gov/npdes). All at-sea processors are required by their NPDES permits to grind discharge waste at sea, prior to discharge. Therefore, the factory discharge water contains primarily fish wash water and small ground fish pieces. As all but one U.S at-sea processor retains fish waste and process it into meal; very little flesh is contained in the waste water.

Similar regulations apply for Canadian at-sea discharges with grinding of wastes to a specified mesh size of before discharge. Canada does not currently allow for domestic vessels to process at sea to fillet/surimi level. Vessels are limited to heading and gutting fish and freezing the product. Offal produced from this type of operation is currently allowed to be discharged from domestic vessels. Like the US, Canada has numerous statutes and regulations governing the waste produced from the Pacific hake fishery (DFO, 2008c)[xli].

Shore-side discharge is monitored by EPA (under NPDES) and state departments of environmental regulation monitor and enforce discharge regulations. As in the at-sea sector, materials must be logged and retained and factory fish waste must be processed and fish material in discharge water must be ground. Wastes are piped from plants, either into sewage systems, piped a suitable distance off-shore, or discharged

into storm water treatment systems, depending on local regulations.

Therefore, waste produced in the Pacific hake fishery is minimized and fish processing waste discharged into the marine environment is regulated.

Scoring Rationale: The first bullet of the 80 SG is met. International conventions (MARPOL) and national laws govern the discharge of garbage and petroleum products; fish processing waste is regulated by the fisheries. Further information is needed to meet the 2nd bullet under the 80 SG. If the quantity of operational wastes is known, the magnitude of its impact could be estimated.

Condition: The achieve a score of at least 80, a report must be prepared, within two years, on the nature and extent of operational wastes across the sectors of the hake fishery, including documentation of any discharge violations that have occurred. Based on these estimates, an assessment must be made of the potential ecosystem effects of such wastes.

[Condition Intent: Recognizing that the quantity and location of operational waste discharge is known, as required by the current environmental permitting system, the condition is seeking to demonstrate what waste is discharged, quantity and location of operational waste for all fleet sectors. By determining whether there are violations of permits (which are assumed acceptable impact levels), it will be possible to make a statement that waste impacts are within measured limits as demonstrated by the Draft ODCE Seafood GP document (http://yosemite.epa.gov/r10/water.nsf/95537302e2c56cea8825688200708c9a/8fc545b9a2c4c47588256da30065a731/$FILE/Draft_ODCE_Seafood_GP.pdf.]

Client Action Plan:

All seafood processors in the Pacific hake fishery are required by state and federal discharge permit regulations to have valid permits, to comply with discharge restrictions specified by these permits, and to report operational wastes on an annual basis. These permits are granted only after the effect of discharges on the marine environment have been evaluated and found to have no "unreasonable degradation of the marine environment." The most recent analysis of the impacts of seafood discharges on the marine environment can be found at (http://yosemite.epa.gov/r10/water.nsf/95537302e2c56cea8825688200708c9a/8fc545b9a2c4c47588256da30065a731/$FILE/Draft_ODCE_Seafood_GP.pdf.] which we have already provided earlier to the certifier. This evaluation is required as a condition for approval of NPDES permits that allow such discharges. The groundfish fisheries and marine environment off the coast of Alaska are not significantly different from that of the Pacific hake fishery; if anything the level of discharges from the Pacific hake fishery is orders of magnitude lower than discharges from seafood processors in groundfish fisheries off the coast of Alaska. We believe this report is sufficient to meet the condition bullet point that says "The impact of operational wastes on target and non-target species have been measured."

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Bullet one action plan-Clients will provide to certifier within two years data on the type, quantity and location of operational wastes for all fleet sectors. Clients will also summarize the number of discharge permit violations by seafood processors in the hake fishery, and quantify the amount of discharges, if any, that exceed allowable levels. A report will be delivered to the certifier within four years that has assessed the potential ecosystem effects of discharges from the hake fishery.

2.1.4 TAVEL Sub-Criterion	Assessments of the fishery regarding impacts on community structure, ecosystem function, on habitats or on the populations of associated species have been conducted.		
Weight	**10.3**	**Score**	
Weighting Rationale	Due to the large volume of removals, potential target species removal impacts (PI 2.1.4.1) is considered significantly more important than the impacts of non-target species removal.		

2.1.4.1	Impacts on ecosystem structure and function from the removal of the target species have been assessed.	• Ecosystem impacts from the removal of the target species are qualitatively estimated. • Investigations are underway to identify potential impacts and, where necessary, reduce them to acceptable levels.	• Some quantitative information is available on consequences of current levels of removal of target species. • Information suggests that there are no unacceptable fishery impacts on ecosystem structure and function within key fishing areas.	• The ecological consequences of current levels of removal of target species have been quantified by direct study and documented. • There are no unacceptable impacts on ecosystem structure and function.
Weight		**75.0**	**Score**	**US=70 CAN=70**

Client: See 2.1.1.1 above. The trophic role of Pacific hake has been described by Livingston and Bailey (1985). Pacific hake is the most abundant groundfish species in the Northeast Pacific. It is a mid-trophic range species – both an important predator as well as an important prey species (Field *et al*, 2006, Livingston and Bailey, 1985))[xlii]. Many of the trophic linkages have been quantified between Pacific hake and their prey as well as between hake and their predators (Ainley *et al*, 1995; Gearin *et al, 1999; Hannah, 1995;NMFS, 2007b)* [xliii]. Changes in abundance of hake, whether due to natural fluctuations in abundance (due to variations in recruitment associated with environmental forcing) or in response to fishing pressure, likely affect the abundance of other species in predictable ways. Fishing mortality has become a more significant component of overall hake mortality in recent years, but key predators, like marine mammals do not appear to have been adversely affected (Field, 2004)[xliv]. In years when there is a more poleward sub-surface flow, there appears to be a shift in abundance of hake to the north with commensurate top down trophic effects. Most species have been shown to have an inverse relationship with hake biomass, apparently due

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

to reduced competition for shared prey (Agostini, 2005; Hannah, 1995; Walters *et al*, 2005; Ware and McFarlane, 1995)[xlv]. Only a few species that prey heavily on hake experience reduced abundance with decrease in hake biomass (Agostini, 2005)[xlvi].

Scoring Rationale: Pacific hake is an important prey species for several predator species. For example, hake has a frequency of occurrence of 83% in the diet of threatened Stellar sea lions of the U.S. west coast (Baraff and Loughlin 2000) and was assumed to constitute 22% of the sea lion diet by Field et al. (2006). The first bullet of the 80 SG is met in that ecosystem models have evaluated the consequences of hake removal on predator and prey species. The second bullet is not met because unacceptable fishery impacts on ecosystem structure and function are not known, therefore a score of 70 is justified. Many ecosystem impacts are linear; thresholds are unknown (Phil Levin, NMFS).

Condition: To achieve a score of 80 or higher, the client must use available data on the consequences of removal of the target species to determine whether there are any unacceptable fishery impacts on ecosystem structure and function within key fishing areas. The milestones are to synthesize the results of existing ecosystem models within 2 years and to assess whether unacceptable fisheries impacts are occurring within 4 years.

[This condition is related to conditions for PIs 2.1.5.1 and 2.2.1.1 below.]

[**Suggestion**: This determination may be based on an ecosystem-based assessment of the hake fishery to include the effects of target and non-target removals on ecosystem function, production and species diversity. The ecosystem-based assessment should incorporate empirical abundance data into appropriate multispecies/ecosystem models, such as Ecopath/Ecosim (Fields et al. 2006) and Atlantis (Brand et al. 2007). The report should quantify the direct and indirect effects of the hake fishery on the principal prey and predator species of Pacific hake. The relevant EIS, NEPA, and equivalent Canadian standards may be used as evidence that the Acceptable Biological Catch of hake does not result in unacceptable impacts on trophic structure or function.

The MSC Fisheries Assessment Methodology section 7.1.12 provides some guidance on determining acceptable and unacceptable ecosystem impacts. Unacceptable impacts are those that cause 'serious or irreversible harm' and/or seriously reduce the ecosystem services. Explicit targets may not be appropriate or available for all ecosystem components, so the scoring guideposts relate to increasing confidence and safety margins with which serious or irreversible harm is avoided.

MSC Fisheries Assessment Methodology 7.1.12
For the Habitat and Ecosystem Components, the concept of 'serious or irreversible harm' refers to change caused by the fishery that fundamentally alters the capacity of the Component to maintain its function or to recover from the impact. This may also be interpreted as seriously reducing the ecosystem services provided by the Component to the fishery, and to other fisheries and human uses. Irreversible harm from fishing includes very slowly reversible harm that is effectively irreversible on time-scales of natural ecological processes (e.g. natural perturbation, recovery and generation times in the absence of fishing, normally one or two decades but may be shorter or longer depending on

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

the species and ecosystem concerned). Examples of serious or irreversible harm include local or global extinction, serious recruitment overfishing, habitat loss on scales that have widespread detrimental consequences for the ecosystem services provided by the habitat (e.g. gross change in species composition of dependent species), and loss of resilience resulting in trophic cascades, fishery mediated regime shifts, etc. Explicit targets may not be appropriate or available for all of the Components, in some cases because there is no scientific or general consensus on appropriate targets. So while performance in relation to targets can be introduced where appropriate, the generic performance requirements SG60 relate to increasing confidence and safety margins with which serious or irreversible harm is avoided, including through the management tools, measures and strategies that are in place.]

Client Action Plan: NMFS and DFO have ongoing programs to develop and monitor ecosystem indicators, based on existing data collection programs, and they routinely analyze and synthesize the results of new data into existing ecosystem models.

Clients will provide a report to certifier within two years that synthesizes the results of existing ecosystem models as they relate specifically to the removal of hake from the ecosystem. A subsequent report will be delivered to the certifier within four years that will include a list of potential ecological impacts (if any), assessments of their magnitude, and a qualitative estimate of the significance of each impact. In the event that unacceptable impacts are established, the clients will lobby PFMC, NMFS and DFO for appropriate change to mitigate these impacts.

2.1.4.2	Impacts on ecosystem structure and function from the removal of non-target species have been assessed.	• Ecosystem impacts from the removal of non-target species are qualitatively estimated. • Investigations are underway to identify potential impacts and, where necessary, reduce them to acceptable levels.	• Some quantitative information is available on consequences of current levels of removal of non-target species. • Information suggests that there are no unacceptable fishery impacts on ecosystem structure and function within key fishing areas.	• The ecological consequences of current levels of removal of non-target species have been quantified and documented. • There are no unacceptable impacts on ecosystem structure and function.
Weight		**25.0**	**Score**	**US=80 CAN=80**

Client: See sections 2.1.2.1 through 2.1.2.4 above. There are no known discernable effects on ecosystem structure and function. Removals of non-target species are low in the Pacific hake fishery. Stock assessments have been conducted on the most of the significant non-target species and on species of concern in particular. Bycatch of species of concern are low and carefully regulated. The fishery does have bycatch that is not subject to TAC and IVQ, such as walleye pollock.

Non TAC species are governed under the existing IVQ plan whether the catch is result of directed or non directed effort. Assessments have been completed for most non-target species however some species have not been assessed recently. Under the IVQ program each vessel is

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

accountable and responsible for catch. All species of groundfish are subject to management measures set out within the Integrated Fisheries Management Plan (IFMP). Catch limits may not be exceeded without penalties or acquiring additional IVQ. If sufficient additional IVQ is not acquired, further fishing by the vessel may be stopped for the remainder of the year.

Offshore hake trips without observers are allowed a 10% bycatch allowance for other groundfish, except sablefish, halibut, and walleye pollock and are subject to available IVQ holdings. The bycatch allowance for pollock is restricted to 30% of the offshore hake landing. Excess catch must be relinquished. Observers must be carried aboard offshore vessels if fishermen wish to retain more than the bycatch allowance when target fishing for hake. Most non-target species of groundfish are covered by IVQ and subject to management measures set out within the Integrated Fisheries Management Plan (IFMP) and may not be exceeded without penalties or acquiring additional IVQ. If sufficient additional IVQ is not acquired, further fishing by the vessel may be stopped for the remainder of the year.

Scoring Rationale: (Scoring Rationale Revised: October 6, 2009) The 60 SG is met. Some information regarding the ecosystem consequences of removal of non-target species exists. For example, bycatch of coastal rockfish species could cause an increase in small demersal fishes, which would favour predators such as lingcod (Phil Levin, NMFS, pers. comm.). Available information suggests that there are no unacceptable fishery impacts. The catch of non-target species is approximately 0.2% of the hake catch. On the basis of biomass only, the ecosystem impact of removing non-target species would be commensurately small. The bycatch of non-target species is strictly regulated, primarily to conserve the bycatch species themselves, but also, implicitly, to conserve their ecosystem functions. Thus, the impacts on ecosystem structure and function from the removal of non-target species can be evaluated through the stock assessments of these non-target species. These stock assessments (e.g. for groundfish species) provide quantitative information on the consequences of current levels of removals. The Assessment Team asserts that, as long as bycatch limits in the hake fishery are not exceeded, that there are no unacceptable ecosystem impacts from the removal of non-target species. Therefore a score of 80 is justified.

2.1.5 TAVEL Sub-Criterion	**Strategies have been developed within the fisheries management system to address and to reduce any significant negative impacts of the fishery on non-target species and ecosystem function (trophic relationships, community and habitat structure).**		
Weight	**20.0**	**Score**	
Weighting Rationale	PI 2.1.5.3, management strategies to reduce bycatch, is most important. PI 2.1.5.1 is more important than PI 2.1.5.2 because understanding acceptable ecosystem impacts is necessary in order to develop appropriate management strategy to reduce/ avoid ecosystem impacts.		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.1.5.1	Levels of acceptable impact on ecosystem function have been determined and reviewed.	• There is some information to determine acceptable impacts for main target and non-target species and habitats, but estimates have not been completed.	• Levels of <u>acceptable</u> impacts for key components of the ecosystem within main fishing areas have been estimated and are regularly reviewed (e.g. < 10 years).	• Levels of acceptable impact (e.g. biological reference points) for key populations and habitats have been estimated and are subject to frequent review (e.g. 1 – 5 years).
Weight		**31.9**	**Score**	**US=70 CAN=70**

Client: As was pointed out above, bycatch rates are extremely low in the Pacific hake fishery (See sections 2.1.2.2 through 2.1.2.4), thus direct impacts of the fishery on other species are low.

The CGRCS has been providing groundfish science support since 1998. The CGRCS efforts include the collection of species and stock specific catch and effort data from at-sea observers; collection of biological samples and other scientific data via surveys or by at-sea observers; design and implementation of fishery independent surveys; contracting of science staff to work cooperatively with DFO science; providing PY and funding support to DFO for technicians working on the observer data and surveys; and participation in the PSARC process. The CGRCS has reached an agreement with DFO to carryout multi-species bottom trawl surveys coastwide as part of an agreed survey strategy. Each year the CGRCS does a survey and DFO does a survey. The CGRCS has conducted the following surveys: WCVI Deepwater multi-species survey in 2001, 2002, 2003; Queen Charlotte Sound multi-species survey in 2003, 2004, 2005, and 2007; West Coast Queen Charlotte Islands multi-species survey in 2006, 2007 and 2008. DFO has conducted the following surveys using CGRCS nets and fishing skippers: West Coast Vancouver Island multi-species survey in 2004 and 2006; Hecate Strait multi-species survey in 2005 and 2007. DFO also conducts the Hake Acoustic survey every two years and the CGRCS usually puts a skipper on board the vessel during the survey.

Indirect trophic effects have been studied (See 2.1.2.2 above) and fishing appears to provide some benefit to other species by reducing predation by hake on forage species.

Scoring Rationale: The 60 SG is met. The argument is made that assessment data for hake and for non-target species are sufficient to determine levels of acceptable impact on ecosystem function. Modeling studies don't indicate a large direct impact of hake on the euphasid population. If hake is overfished, it is possible that some of the hake competitors would have more food (e.g. salmon). Competitors could include pinnipeds, birds, and some fish. Conversely, overfishing of hake could reduce the food available to predator populations. Impacts on the ecosystem function can be considered minor; however unacceptable impact levels have not been determined and reviewed. Therefore the 80 is not met.

Condition: To reach a score of 80, client must provide, within two years, evidence that levels of acceptable impacts are estimated and regularly reviewed. This PI should score 80 upon completion of PI 2.1.4.1 above.

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[Suggestion: Evidence may include a summary of text excerpts from available documents (e.g. a NEPA EIS and analogous Canadian document) that cite specific quantitative or qualitative levels of impact related to hake, and describe thresholds of acceptability. The periodicity of these assessments should also be provided to justify such assessments are done periodically. Refer to MSC FAM 7.1.12 as it provides definition of undesirable, unacceptable impacts for certified fisheries.]

Client Action Plan: Same as action plan for 2.1.4.1.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.1.5.2 Management strategies are in place to avoid and/or to reduce ecosystem impacts (i.e. Physical impacts, lost gear, operational waste, effects on ecosystem structure).	• Limited management strategies exist to avoid and/or to reduce impacts on the ecosystem. • Strategies are untested but similar to strategies successfully implemented in other fisheries.	• Management strategies exist to detect and to reduce impacts, although these have not been fully tested. • The management strategies are designed and proven to adequately protect key aspects of the ecosystem within main fishing areas.	• Tested management strategies are in place to detect and to reduce impacts. • The management strategies are designed and proven to adequately protect ecosystems and habitats throughout the range of the fishery.
Weight	**22.1**	**Score**	**US=80 CAN=80**
Client: See section 2.1.3.1, 2.1.3.2, and 2.1.3.3 above. Pelagic gear requirements and the EFH amendments provide management strategies to protect physical habitat. There is little or no bottom contact or gear loss. Operational waste is minimized through incentives to retain bycatch in the US. Bycatch is also low and nearly all of it is retained in Canada. Onshore meal plants are used to render offal into fish meal and oil, which keeps operational waste low. Onshore processors have strict environmental waste removal regulations. The vessels which head and gut fish have grinders on board for offal and are subject to 100% observer coverage. Joint venture vessels have strict regulations for processing and the disposal of offal and are required as a condition of the Canadian license to process all offal into meal. DFO notifies industry by issuing a Notice to Industry accessible to the public and on the DFO website. In addition, DFO discusses and distributes details with the Groundfish Trawl Advisory Committee (GTAC) any new “addition” to the habitat, i.e. sunken vessels, cables, seismic equipment etc. In Canada, there are explicit provisions in the management plan/conditions of license to manage ecological impacts in addition to incentives inherent in the IVQ/GDA system. These include: Year round sponge reef closures to bottom trawling (to protect four unique sponge reef ecosystems) IFMP p. 5-7 Year round trawl closures to reduce harvesting pressure on localized stocks of fish and to provide improved access to food, social, and ceremonial fish for First Nations (e.g. IFMP p 8) Year round trawl closures to minimize catch of juvenile halibut (e.g. p 8) Periodic trawl closures to reduce harvesting pressure on stocks during spawning periods (e.g. p 9) Periodic trawl closures to protect crabs during the soft shell period Periodic closures to prevent conflicts with other fishing gears (e.g. p 11) Year-round trawl closures to protect shellfish interceptions and shallow water habitat concerns.			

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Year round species closures (non-retention) in inside waters to protect lingcod and rockfish (p 4).
Bottom trawling (and other fishing gear) prohibitions in a coastwide network of Rockfish Protected Areas (RPAs)
Mesh restrictions (p. 15).to eliminate retention of certain species at age/length
These and other management measures result from a continuous process of evaluation and review based on assessment results, information gained through the at-sea observer program, and consultations with stakeholder groups.

Scoring Rationale: The client submission included a long list of acts and orders, some of which relate to the ecosystem effects of Canada's hake fishery. These were taken from the DFO website: http://www.dfo-mpo.gc.ca/acts-loi-eng.htm. The new Fisheries and Oceans Canada Regulatory Plan (2008–09) will be posted in the coming months. The US hake fishery is governed by the Magnuson-Stevens Act. Fishing vessels are subject to Coast Guard inspection for compliance with and operational waste regulations.

The 80 SG is met. The assessment team heard testimony that ecosystem impacts are minor, which suggests that management strategies are effective at avoiding adverse impacts. A score of 90 is justified, as parts of both elements of the 100 SG are addressed

2.1.5.3	Management strategies are in place to avoid and/or to reduce bycatch.	• Limited management strategies exist to avoid and/or to reduce bycatch. • Strategies are untested but similar to strategies successfully implemented in other fisheries.	• Management strategies exist to detect and to reduce bycatch, although these have not been fully tested. • The management strategies are designed and proven to adequately protect key bycatch species within main fishing areas.	• Tested management strategies are in place to detect and to reduce bycatch. • The management strategies are designed and proven to adequately protect bycatch species throughout the range of the fishery.
Weight		**46.0**	**Score**	**US=90 CAN= 95**

Client: The bycatch of non-target species in the US hake fishery is assessed with shoreside monitoring and sampling, and through the WCGOP[xlvii] at-sea observer programs where 100% coverage is required of at-sea catcher/processors and mother-ships. At sea-catcher vessels currently have electronic monitoring and the shore-based fleet has a 100% retention program with dockside observers, while an observer program is being developed by the Pacific Fishery Management Council. Bycatch limits have been imposed on the various sectors of the Pacific hake fishery using a "scorecard" approach to ensure that intersector and intra-sector bycatch does not exceed optimum yield or rebuilding limits for overfished species[xlviii]. Incentives are used to facilitate retention of bycatch species to prevent waste and ensure accountability of total mortality (see section 2.1.2.1 and 2.1.2.4 above).

The Canadian fishery has an observer program with 100% coverage of at-sea vessels that head and gut fish, and the joint venture/ foreign fleet.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Shore based fleets are subject to a minimum 10% at-sea observer monitoring in the lower west coast Vancouver Island area, where bycatch concerns are minimal. If the incidence of non-target species is observed to be high, then additional at-sea monitoring is prescribed. Shore-based fleets are subject to 100% monitoring coverage for fishing trips for shore delivery in locations other than the lower west coast of Vancouver Island. This is a combination of at-sea observers and electronic monitoring (EM). A minimum of 10% at-sea observer coverage is prescribed. EM is 100% coverage. Vessels fishing with only EM must retain all catch. All Canadian hake vessels are subject to 100% dockside observer coverage, regardless of catch location. The requirement to carry an observer is set out with the IFMP and Hake Harvest Plan, while the regulatory authority to carry the observer is found within the Fisheries General Regulations.

IVQ's are used to account for and limit bycatch. At beginning of each trip skipper is given his up-to-date individual Quota Status Report. This shows his available quota in "real time" and therefore provides incentive for his next trip to fish to reduce or avoid bycatch.

Scoring Rationale: The 80 SG is met. The US fishery has some holes in observer coverage that are now being filled. The assessment team heard evidence that bycatch is being reduced and that bycatch behaviour is improving, which indicates that management strategies are effective in reducing bycatch. Thus the first bullet of the 100 SG is met. The management strategies cannot be considered proven to adequately protect bycatch species, while some species remain depleted, and a score of 90 is justified for the US.

In Canada there are strong incentives not to exhaust bycatch quota. The fisheries have never been shut down because of lack of bycatch allocation available (Barry Ackerman, DFO). A score of 95 is justified for Canada.

2.2 - MSC P2 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.**		
Weight	**28.6**	**Score**	**US=85.88 CAN=85.88**
Weighting Rationale	Sub-criterion 2.2.2 (fishery impacts on known ETP species) is significantly more important than on biological diversity (SC 2.2.1) which is not considered to be of high importance for this fishery.		

2.2.1 TAVEL Sub-Criterion	**Fishing is conducted in a manner that does not have unacceptable impacts on biological diversity.**		
Weight	**25.0**	**Score**	

PERFORMANCE INDICATOR		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.1.1	The effects of the fishery on biological diversity and productivity have been assessed.	• There are no direct studies on the effects of the fishery on biological diversity and productivity. • Qualitative estimates of impacts on biodiversity and productivity have been made with general information from the fishery and the scientific literature. • There is no evidence to suggest unacceptable impacts on biodiversity.	• Effects on biological diversity and productivity within fishing areas are being studied. • Programs are in place to determine acceptable limits of impacts in fishing areas, and these are considered in the fishery management. • Current information does not indicate any unacceptable impacts	• Effects on biological diversity and productivity are well documented. • Acceptable tested/justified limits have been identified and are used to assess fishery related impacts. • Programs that reduce impacts on biological diversity to acceptable levels are in place. • Impacts are within acceptable limits.
Weight		**100.0**	**Score**	**US=75 CAN=75**

Client: See 2.1.2.2 through 2.1.2.4 and 2.1.5.1 above. The Pacific hake fishery has a very low bycatch rate. Direct species impacts on biodiversity are very low. Fishing mortality on Pacific hake is regulated through stock assessments and annual quotas in the US and Canada. Indirect impacts due to harvest are thought to benefit some species due to reduced mortality of Pacific hake's forage species[xlix].

Scoring Rationale: The 60 SG is met. The standard metrics of food-web structure have been derived. Species diversity is not well handled in ecosystem models that aggregate species into groups. Some work has been done looking at patterns in diversity of 220 groundfish species in bottom-trawl surveys since 1977 (Phil Levin, NMFS). Since then there have been major changes in the ecosystem and gross reorganization in the food web (e.g. declines in large, long-lived rockfish). However, species diversity has not changed and functional diversity is maintained. Species-area relationships have not changed (Phil Levin, NMFS). Current information does not indicate any unacceptable impacts of the hake fishery on biological diversity and productivity, but there are no direct studies of the effect of fishing on diversity. The first two bullets of the SG 80 are partially met and the third bullet is met, thus justifying a score of 75.

Condition: The corrective action is described under PI 2.1.4.1 above.

[Suggestion: The first two bullets of the SG 80 are partially met and the third bullet is met. Productivity is well studied, there is far less information on biological diversity. Using existing information and the MSC definition of unacceptable impacts as a starting point, the client should be able to make reasoned arguments about the effects of the fishery on biological diversity.]

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client Action Plan: Same as action plan for 2.1.4.1.

2.2.2 TAVEL Sub-Criterion	**Fishing is conducted in a manner that does not have unacceptable impacts on recognized protected, endangered or threatened species.**		
Weight	**75.0**	**Score**	
Weighting Rationale	Management strategy (PI 2.2.2.5) is most important, requires information from other four PIs in order to successfully implement effective management strategy. PI 2.2.2.3 is least important because trophic interactions between target and ETP are believed to be known. Remaining three PIs are of equal importance.		

2.2.2.1	There is information on the presence and distributions of listed (rare, threatened, or endangered) or protected species in the main fishing areas.	• There is a program implemented to identify listed and protected species directly related to the fishery.	• Key listed and protected species directly affected by the fishery have been identified. • Monitoring programs are in place to characterize geographic distribution and extent of impact.	• There is knowledge of all populations of protected and listed species directly or indirectly related to the fishery. • The type and distribution (spatial and temporal) of critical habitats for listed and protected species have been identified.
Weight		**20.0**	**Score**	**US=90 CAN=90**

Client: Rare, threatened, or endangered species are identified through the federal Endangered Species Act of 1973.[I] The distribution and abundance levels of key rare, threatened, or endangered species have been described[Ii] In addition; the PFMC and NMFS identify depleted or overfished species in accordance with the Magnuson-Stevens Act[Iii] , and have specified rebuilding plan amendments to the Pacific Coast groundfish FMP for these species. Likewise, Canada identifies and protects species through its Species at Risk Act (SARA) and through the Department of Fisheries and Oceans Fishery Management Plans[Iiii].

Scoring Rationale: Laws and regulations exist in Canada (SARA) and the US (ESA) to identify endangered, threatened, and protected (ETP) species. ETP species include listed stocks of Chinook salmon, Stellar sea lion, and the marbeled murrelet. Biological opinions are available for most ETP species, thus a score of 90 is justified. In Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has recommended that bocaccio be listed as threatened under SARA. In Canada, Chinook salmon interceptions are not an issue and seal captures are few (Barry Ackerman, DFO).

PERFORMANCE INDICATOR		SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.2.2	Population sizes and trends of listed or protected species are adequately known, including interactions with the fishery.	• Trends in the abundance of listed or protected species are known. • The main interactions directly related to the fishery are known.	• Population assessments exist for listed or protected species. • Quantitative estimates are made of the interactions between the fishery and listed and protected species.	• Regular assessment of listed and protected species occurs. • Reliable quantitative estimates are made of the interactions between all protected species and the fishery, and qualitative information is available on indirect effects.
Weight		**20.0**	**Score**	**US=90 CAN=90**

Client: The Northern Steller sea lion (*Eumetopias jubatus*) was listed as threatened under the ESA in 1990 and is under a recovery plan, which includes detailed data on population sizes and trends[liv]. While declines were noted in the Eastern part of its range, the populations off Southeastern Alaska and Canada have been increasing at about 3% per year and the Canadian population is currently at its historically high abundance level (DFO SARA Management Plan for Steller Sea Lions). As mentioned above (see 2.1.2.4), non-target groundfish catch in the Pacific hake fishery are very low. Widow rockfish and canary rockfish are currently overfished and under rebuilding plans in the US. Stock assessments are conducted to track and update population trends and rebuilding targets[lv].

Listed species of Pacific salmon, the Northern Steller sea lion, and marbled murrelet have been evaluated with respect to potential interactions with fisheries in the US. Listed species in Canada fall under SARA (see 2.2.2.1 above). In Canada, marine mammal regulations fall under the Fishery Act. No significant interactions with the trawl fisheries for Pacific hake in the US or Canada have been identified for listed marine species of birds, mammals, or fish.

The Pacific hake fishery is not thought to have any significant impact on threatened or endangered marine mammals in the US or by Canadian authorities. The US Marine Mammal Protection Act Requires that all fisheries be classified into one of three categories level of incidental serious injury and mortality of marine mammals occurring in each fishery. Category I and II fisheries have the highest impact and vessel operators may be required to act in accordance to special provisions of the MMPA. Registered vessels must obtain a marine mammal authorization to legally incidentally take a marine mammal. The Pacific hake fishery is classified as a category III fishery and impacts are considered low (less than or equal to less than 1% of the permitted biological level (PBR)[lvi]. Vessel operators must still report mortalities or injuries of marine mammals to the NMFS Office of Protected Resources[lvii]. Interaction of the Pacific hake fishery with Northern Stellar sea lions is not likely as fishing effort is well north of major breeding and pupping grounds in southern Oregon and northern California[lviii]. Reporting of mortality or injury of marine birds is voluntary for category III fisheries. Groundfish trawl fisheries are thought to have minimal interactions with marine birds, even though they are seen feeding on offal[lix].

A few depleted species of salmon and groundfish are known to interact with the Pacific hake fishery. Species of particular concern are ESA listed Chinook salmon and overfished groundfish species - widow rockfish and canary rockfish. Section 7 evaluation of impacts under the Endangered Species Act indicates that harvest levels of up to 11,000 salmon would not affect the recovery of any endangered salmon stocks.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

All species of concern have stock assessments and bycatch caps. Overfished groundfish species are under federally mandated rebuilding plans. As mentioned above, the PFMC and NMFS monitor bycatch limits through the use of a sector specific scorecard and QSM reports. Total mortality for these species is updated several times a year and regulations are adjusted to keep catch within caps (See section 2.1.2.4).

In Canada, Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has recommended that bocaccio be listed as threatened under SARA. At present, the Minister of Environment has not yet agreed to list bocaccio. Industry volunteered that vessels are now required to relinquish all bocaccio catch at the point of landing – there are no incentives to target on this species. A new assessment is being undertaken by DFO's Pacific Biological Station. Bocaccio is not a significant component of the bycatch in the Canadian hake fishery, averaging about 1.5 metric tons per year compared to an average hake catch of about 86,000 metric tons per year. US ESA listed Chinook salmon may be encountered in the Canadian hake fishery. Salmon are a prohibited species and they may not be retained. International treaties regulate the allowable mortality on Pacific salmon[lx].

Scoring Rationale: The 80 SG is met. The bycatch of Chinook salmon is estimated by the observer programs. Molecular genetic techniques are used to identify salmon bycatch to stock of origin. The first bullet of SG 100 is met, thus a score of 90 is justified.

2.2.2.3	Trophic (predator-prey) interactions between the target species and listed or protected species have been adequately determined.	• The main trophic interactions between the target species and listed and protected species are known.	• Research programs exist to quantify the trophic interactions between the target species and listed and protected species. • Fishing is conducted in a manner that does not have unacceptable impacts on the prey species of listed or protected species.	• Direct quantitative studies have been conducted on the interactions between the target species and listed and protected species. • Diets and foraging requirements of listed and protected species are well known.
Weight		**10.0**	**Score**	**US=85 CAN=85**

Client: Pacific hake is recognized as an important food item for many marine mammal predators, including the listed Northern Steller sea lion[lxi]. There is evidence that increases or decreases in Pacific hake abundance do not have strong effects on sea lions. Reductions in hake abundance may reduce competition for prey species that sea lions feed on. Likewise, increases in hake abundance offer prey opportunities for sea lions[lxii]. Interactions with other protected species are well described and limited by regulations (see sections 2.1.2.1 through 2.1.2.5 above). Groundfish under rebuilding plans in the US share some of the same prey base as Pacific hake. As was pointed out in 2.1.4.1 above, most competitor species under protection are likely to benefit from harvest related reductions in hake biomass.

Scoring Rationale: The 80 SG is met. Hake is an important prey item of a threatened species, Stellar sea lions (Baraff and Loughlin 2000,

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Field et al. 2006). Impacts of the hake fishery on sea-lion feeding are considered acceptable. The diets of listed and protected species are known in general. Therefore a score of 85 is justified.

2.2.2.4	Permitted take levels for listed (rare, threatened, or endangered) or protected (PET) species have been established.	• Permitted take levels for listed or protected species are under development. • Known mortalities are within acceptable limits of national and international legislative requirements and are believed to create no biological threats to the species concerned.	• Permitted take levels have been established for the main listed or protected species. • Available information indicates that current mortality of PET species is below permitted take levels.	• Permitted take levels have been established for all listed or protected species. • Permitted take levels are established for subpopulations and/or geographic areas. • It is established that the direct and indirect effects of fishing on PET species are within permitted take levels.
Weight		**20.0**	**Score**	**US=90 CAN=90**

Client: See 2.2.2.3 above. Permitted levels of listed species are not a particular issue for category III fisheries and bycatch caps are in place for protected species. Similarly, marine mammal and bird interactions are low and there is only one groundfish species of concern taken in small amounts in Canada's hake fishery - bocaccio. IVQs are used to track and limit harvest of groundfish in Canada (See 2.1.2.1 and 2.1.2.2 above). ESA listed salmon could be encountered in the US and Canadian fisheries. Retention of salmon in US fisheries is prohibited unless accommodated under a permit for shore based vessels which may deliver catch unsorted.

Salmon in Canada is by condition of the groundfish trawl license a prohibited species, and thus cannot be legally retained by the vessel. The fishery has been subject to 100 % dockside monitoring and if delivered is fully accounted for in catch records.

See 2.2.1.1 and 2.2.1.2 above. The taking of species listed under ESA guidelines in the US and DFO/SARA in Canada has been determined and the Pacific hake fishery is not a risk factor in exceeding allowable mortality.

Scoring Rationale: The 80 SG is met. Permitted take levels are established (e.g. 11,000 chinook salmon in the US fishery) or retention of ETP species is prohibited. Permitted take levels are not established for subpopulations. The 100 SG is partially met, thus a score of 90 is justified.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
2.2.2.5	Management strategies are in place to keep the impacts of the fishery on listed and/or protected species within agreed and sustainable limits.	• Limited management strategies exist to identify and avoid/reduce fishery impacts on protected species. • Programs to mitigate impacts are under development. • Strategies are untested but similar to strategies successfully implemented in other areas.	• Management strategies are implemented to detect and to reduce fishery impacts on key listed and protected species within the main fishing areas. • Take levels do not exceed the permitted levels. • Strategies are proven to adequately protect key listed and protected species.	• Tested management strategies are implemented to detect and to reduce impacts on all protected, endangered, or threatened species. • Strategies are proven to adequately protect all listed (rare, threatened or endangered) and protected species.
Weight	**30.0**	**Score**	**US=90 CAN=90**

Client: With respect to ETP species, see 2.2.2.1 above.

Scoring Rationale: The 80 SG is met. Take levels are within the permitted levels. The take of marine mammals in the US fishery is approximately four per year. NMFS consults regularly with the Fish and Wildlife Service regarding seabirds and marine mammals (Vanessa Tuttle, NMFS). For species listed under the Endangered Species Act, Biological Opinions indicate the level of harvest to prevent harm. The first bullet of SG 100 can be considered met because existing management strategies keep the fishery impacts within permitted levels, so a score of 90 is justified. Specific proof that management strategies adequately protect all ETP species has not been provided, so a score of 100 can not be awarded.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.3 - MSC P2 Criterion 3	**Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.**		
Weight	**28.6**	**Score**	**US= 87 CAN=87**
Weighting Rationale			

Scoring Intent	**The MSC Technical Advisory Board directs that this Criterion is only scored in the instance that non target species are determined to be in a depleted state hence a recovery plan is already in action. The decision whether non-target populations are depleted will be made upon scoring subcriter 2.1.2 above.**

2.3.1 TAVEL Sub-Criterion	**There are management measures in place that allow for the rebuilding of depleted populations to specified levels within defined timeframes.**		
Weight	**100**	**Score**	
Weighting Rationale	PI 2.3.1.2 is more important as it evaluates management measures to allow recovery and is based on the information required by PI 2.3.1.1.		

2.3.1.1	There is sufficient information to allow determination of necessary changes in fishery management to allow recovery of depleted populations to specified levels.	• There is some information on fishery impacts on non-target species, which can be used to alter fishing practices to rebuild depleted species.	• There is adequate information, combined with a precautionary approach wherever necessary, to allow alterations to be made to fishing practices to rebuild depleted populations to specified levels.	• There is a clear understanding of the fishery impacts on non-target species. • Intervention measures based on this understanding have been tested and confirmed effective in promoting recovery of depleted populations to specified levels.
Weight		**40.0**	**Score**	**US=90 CAN=90**

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client: The Pacific hake fishery is not thought to have any significant impact on threatened or endangered marine mammals in the US or by Canadian authorities. The US Marine Mammal Protection Act Requires that all fisheries be classified into one of three categories level of incidental serious injury and mortality of marine mammals occurring in each fishery. Category I and II fisheries have the highest impact and vessel operators may be required to act in accordance to special provisions of the MMPA. The Pacific hake fishery is classified as a category III fishery and impacts are considered low (less than or equal to less than 1% of the permitted biological level (PBR)[lxiii].

Most of the important non-target species caught in the Pacific hake fishery are groundfish. Important bycatch species include widow rockfish, canary rockfish, darkblotched rockfish and yellowtail rockfish in US waters, and pollock, spiny dogfish, arrowtooth flounder, yellowtail rockfish, and Pacific Ocean perch in Canadian waters. Stock assessments have been completed for all non-target overfished species. Pacific hake was, for a short period of time, considered overfished but now has been determined to be recovered[lxiv]. Widow rockfish, canary rockfish, darkblotched rockfish and Pacific Ocean perch are still considered overfished[lxv] along with other rockfish caught in much smaller amounts by the US fleet (See Table 1 in 2.3.1.2 below)[lxvi]. Federal rules require necessary changes by all fisheries in order to implement rebuilding plans. Stock assessments have not been conducted on all species of groundfish, however the National Marine Fisheries Service conducts trawl surveys off Washington, Oregon, California on an annual basis. Declines in abundance of non-target species caught in the hake fishery that might signal a problem would likely be detected by these surveys. Bocaccio is also caught in small amounts in the Canadian hake fishery. COSEWIC has recommended that bocaccio be listed as threatened under SARA. At present, the Minister of Environment has not yet agreed to list bocaccio. A new assessment is being undertaken by DFO, and the government has implemented industry agreed to measures in the IFMP to remove incentive to direct fishing for bocaccio. Vessels are required to relinquish all bocaccio catch at the point of landing. If a species is determined to be depleted under SARA, the DFO would work in concert with the CGRCS, and the GTAC to develop recovery plans.

Therefore, management has estimates on abundance trends of non-target demersal species to assess status and implement recovery strategies or plans. Sufficient information exists and a system is in place for the recovery of non-target species of significance in the hake fishery.

Scoring Rationale: For rockfish there is adequate information to allow alterations to fishing practices. Changes in fishing practices include moving fleets away from areas of high bycatch, closed areas, and fisheries closures. For example, in 2008 the fleet did stand down in light of high rockfish catches. These changes in fishing practices and behaviour can be considered a precautionary approach. Thus the 80 SG is met. The first bullet of SG 100 is met. Intervention methods have not been confirmed effective in promoting recovery of depleted populations. A score of 90 is justified.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

2.3.1.2	Management measures are in place for the Pacific hake fishery to allow recovery of depleted populations within specified time frames.	• A mechanism exists to modify fishing practices in light of the identification of unacceptable impacts.	• Management measures have been implemented to modify fishery practices. • These measures are effective at rebuilding depleted populations to specified levels within appropriate time frames (normally 10 years or three generations).	• Monitoring programs have demonstrated that implemented management measures are effective in allowing recovery of depleted populations.
Weight		**60.0**	**Score**	**US=85 CAN=85**

Client: See section 2.3.1.1 above. The management system provides for effective measures for the Pacific hake fishery to aid in the recovery of affected non-target populations.

Overfished groundfish species are the most important non-target species of concern that may be caught by the Pacific hake fishery. NMFS requires rebuilding plans for overfished species. Management measures appear to be effective for some non-target species. For example, Pacific hake and lingcod (in the northern groundfish management area) are considered to be no longer overfished. Other, longer lived rockfish species are on a longer rebuilding time frame. The most recent rebuilding plans for darkblotched rockfish, Boccaccio and widow rockfish indicate populations of these species are continuing to be rebuilt towards their target levels (See Table 1).[lxvii]

Scoring Rationale: The client submission includes Table 1, which contains median rebuilding times for various fishing levels in 2009 and 2010. The 80 SG is met. Some depleted populations are rebuilding, justifying a score of 85.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

MSC Principle 3	**The fishery is subject to an effective management system that respects local, national and interjurisdictional laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.**		
Weight	**33.3**	**Score**	**US=88.67 CAN=89.08**
Weighting Rationale	All MSC Principles are weighted equally as per MSC fisheries certification methodology. Criteria in the first group, 3.1, 3.4 and 3.7 are more important than Criteria in the second group, 3.2, 3.3, 3.5, 3.6 and 3.8. Each group of Criteria are considered to be of equal importance within the group.		

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.*

3.1 TAVEL Criterion 1	The management system has a clearly defined scope capable of achieving MSC Principles 1 and 2 and their associated criteria. This includes short and long-term objectives and associated strategies including those for managing the ecological impacts of fishing, consistent with a well-managed fishery.		
Weight	**15.8**	**Score**	
Weighting Rationale	PI 3.1.2, fishery objectives, are significantly more important that other three PIs. Procedures to measure management performance (3.1.4) are considered more important than 3.1.1 and 3.1.3, which are considered of equal importance.		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.1.1 *(Relates to MSC Criterion 3.2)*	All agencies (federal, state, provincial, tribal and interjurisdictional) in the fisheries management system have clear-cut lines of responsibility. Their functions, particularly those involving interactions between these authorities are clearly defined.	• Federal, state, provincial, tribal and interjurisdictional organizations responsible for interacting in the management process have been identified. • Functions and responsibilities among entities are generally understood.	• Functions and responsibilities requiring interactions among the entities are explicitly defined and codified. • Agencies with jurisdiction agree to and support a common management policy, which requires use of the resource to be responsible and sustainable.	• Interactions between entities are regularly evaluated and modified where necessary to ensure consistency and fairness.
Weight		**18.1**	**Score**	**US=90 CAN=90**

Client: State, federal, provincial, and tribal agencies all have clear lines of authority.

US Fishery

In the US, the National Marine Fisheries Service (NMFS) is the ultimate authority for management of the hake fishery off the coast of Washington, Oregon, and California[lxviii]. State agencies also regulate fishery landings, processing, and the shoreside hake industry through rules and statutes, which are consistent with federal rules and guidelines. Fisheries management functions for the hake fishery in the US are described in the Pacific Coast Groundfish Management Plan and federal annual fishery specifications documents and the Code of Federal Register[lxix]. The Makah Tribe hake fishery began in 1996. The Makah allocation since 1997 has ranged from 23,000 to 35,000 m.t. based on a sliding scale allocation agreement, which reflects the Makah's treaty right to harvest hake within its usual and accustom (U & A) fishing area. The adjudicated ocean area for the Makah Tribe extends from the Canadian border south to 48 02 15 N and west to 125 44 W. As a Makah treaty fishery, all harvest vessels must be owned and crewed by enrolled Makah tribal members. Annual harvest specifications and management measures are developed in consultation with National Marine Fisheries Service and adopted by the Pacific Management Council, which are then published in the Federal Register. The Tribe participates in the federal observer program throughout the season. The Tribe actively participates in the Pacific Management Council process and the annual US/Canada hake stock assessment. Tribal and NMFS enforcement agents monitor the fishery for compliance with tribal and federal regulations (: Joner, S.).)

Canadian Fishery

Fisheries and Oceans Canada (DFO) is the sole regulatory agency responsible for management of the hake fishery on Canada's Pacific coast. With a single regulatory agency charged with managing the fishery within Canada, the lines of responsibility are clear-cut.

Management functions for the BC groundfish fishery are detailed in the *Groundfish Integrated Fisheries Management Plan* (IFMP) [lxx]. The

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

groundfish trawl portion of groundfish management is described in Appendix 8 of the IFMP (*Groundfish Trawl Commercial Harvest Plan*). The *Pacific Offshore Hake Harvest Plan* is an addendum to the annual IFMP for groundfish.

The Province of British Columbia has a regulatory role with respect to processing, and acts in an advisory capacity to DFO in the fishery management realm. There is no ambiguity in roles and responsibilities in management of hake within B.C.

International

Trans-boundary issues – such as research and stock assessment and setting of TACs - are addressed as set out in the *Agreement Between the Government of Canada and the Government of the United States of America on Pacific Hake/Whiting (*Canada/US Hake/Whiting Agreement) signed in 2003 by the two governments. Although the Canada/US Hake/Whiting Agreement has not yet been formally ratified by Canada, the parties began to implement the Agreement in 2004. Since then, the US and Canada have acted under the accords of the agreement in good faith by conducting joint assessments and by setting and dividing TACs.[lxxi] Canada is expected to ratify the treaty in 2008.

There is no ambiguity in roles and responsibilities in management of the hake within the US (including tribal) and Canada, or between either nation.

Scoring Rationale: Current procedures and lines of responsibilities and long-standing history of cooperation justify a score of 90. A score of 100 would be achievable if there were an explicit process for periodic evaluation of the inter-jurisdictional coordination when the treaty is implemented.

3.1.2 *(Relates to MSC Criteria 3.2, 3.7, 3.10)*	The management system contains clear short- and long-term objectives.	• Short- and long-term resource and environmental objectives are implicit within the management system.	• The management system contains explicit short- and long-term resource and environmental objectives that are periodically evaluated.	• The management system contains clear and explicit short- and long-term resource, environmental, and socio-economic objectives that are regularly measured by performance indicators.
Weight		**37.3**	**Score**	**US=95 CAN=95**

Client:

US Fishery

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

In the US, Pacific hake is managed under a federal plan for groundfish which is consistent with the Magnuson-Stevens Act and its associated 10 National Standards. Clear and explicit short and long-term goals and objectives were developed and are maintained through the ongoing processes of the Pacific Fishery Management Council. These goals and objectives, consistent with the National Standards, are described within the groundfish Fishery Management Plan, the biennial specifications, and associated amendments[lxxii]. US goals and objectives focus on conservation as the first priority, followed by socio-economics, and utilization. The performance of the Pacific hake fishery with respect to FMP goals and objectives is measured biennially against specifications (performance indicators) outlined in the specifications documents. Managers have annual checkpoints allowing adjustment of fishery specifications within a given 2-year management cycle, if needed.

Canadian Fishery

DFO's long term, overarching objectives for fishery management are clarified in legislation (Oceans Act) and in public policy statements.

Canada subscribes and adheres to a variety of international protocols, including the Canada/US Hake/Whiting Agreement (yet to be ratified), the Precautionary Approach, the Code of Conduct for Responsible Fishing Operations, and various FAO initiatives. DFO maintains and communicates a clear priority in managing fish stocks: conservation is the first priority, followed by provision of opportunities for First Nations to harvest for food, social, and ceremonial purposes. Recreational and commercial fisheries hold tertiary priority.

In managing commercial fisheries, DFO applies a precautionary approach, whereby any conflicts between conservation and commercial harvest are resolved as a matter of policy in favor of conservation. The scientists conduct stock assessments using all of the available survey, sampling, and harvesting information. They incorporate conservative assumptions into their assessments and develop tables that show the probability of a stock declining below a reference point at a given harvest level / or the probability of a stock rebuilding to a specified level at a certain harvest level. Stock points of reference are now required in all assessments. The assessment is then reviewed by two reviewers and the Pacific Stock Advice Review Committee (PSARC) also reviews the assessment. PSARC is the Pacific Regional body responsible for review and evaluation of all scientific information on the status of living aquatic resources and biological aspects of stock management.

PSARC undertakes a scientific peer review and advisory process in order to provide internal and external stakeholders with scientific information and advice that is reliable, relevant, timely and comprehensive. PSARC advises the Resource Management Executive Committee (RMEC) and the Regional Management Committee (RMC) of Fisheries and Oceans Canada and other bodies on stock and habitat status and potential biological consequences of fisheries management actions and natural events[lxxiii].

The reviewers' comment and make recommendations regarding whether or not to accept the assessment and advice or to ask for revisions and/or to make additional recommendations for the fishery manager. The fishery manager considers the advice from science, and input from industry and other stakeholders, when formulating the TAC recommendation that is submitted to the Pacific Region Director General for approval.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

The groundfish IFMP, the Groundfish Trawl Commercial Harvest Plan, and the Pacific Hake Harvest Plan contain numerous short term objectives including: protection of sponge reefs, inshore rockfish conservation, adherence to the Species at Risk Act, seabird avoidance, observing and accounting for rockfish catch, and management of halibut bycatch. The short and long term objectives of the management system are clearly stated and communicated by DFO to the commercial industry. Fishing plans are annually tailored to meeting evolving long and short term objectives.

Scoring Rationale: 95 for both countries because the management systems contain clear and explicit short- and long-term resource, environmental, and socio-economic objectives that are regularly measured by performance indicators. A score of 100 would be achievable if there was more cohesion between the two management systems in the review process.

3.1.3 *(Relates to MSC Criteria 3.2, 3.4, 3.6, 3.7)*	The management system takes into account socio-economic impacts in the development of management plans.	• The fishery management system gives consideration to the long-term socio-economic interests of people and communities dependent on fishing. • The fishery is free from subsidies that directly and substantially promote overcapacity and excess input use. • The management system considers possible behavioral responses to effort control, (e.g. shorter seasons cause investments in vessel mobility). • Management measures exist to limit entry and prevent excessive capitalization.	• The management system incorporates the long term socio economic interests of people and communities dependent on fishing in its objectives and strategies. • The management system promotes measures that achieve conservation objectives in a cost-effective manner. • Measures for controlling effort take into account the need to reduce race-to-fish incentives, thereby reducing wastage and fishery inefficiencies. • The management system has adopted measures to prevent excess capacity growth.	• Managers have adopted measures that give harvesters incentives to increase the economic value rather than the volume of catch. •The adopted measures align incentives for sustainability of the fishery with socio-economic objectives.
Weight		**18.1**	**Score**	**US=85 CAN=100**

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client:

US Fishery

Socio-economic analyses are integrated in the Council process and are detailed in the biennial specifications and environmental impact statements associated with groundfish FMP amendments[lxxiv]. FMP objectives which speak to socio-economic issues include:

Economic Objectives

- Objective 6. Within the constraints of the conservation goals and objectives of the FMP, attempt to achieve the greatest possible net economic benefit to the nation from the managed fisheries.
- Objective 7. Identify those sectors of the groundfish fishery for which it is beneficial to promote year-round marketing opportunities and establish management policies that extend those sectors fishing and marketing opportunities as long as practicable during the fishing year.
- Objective 8. Gear restrictions to minimize the necessity for other management measures will be used whenever practicable. Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP.

Social Objectives

- Objective 12. When conservation actions are necessary to protect a stock or stock assemblage, attempt to develop management measures that will affect users equitably.
- Objective 13. Minimize gear conflicts among resource users.
- Objective 14. When considering alternative management measures to resolve an issue, choose the measure that best accomplishes the change with the least disruption of current domestic fishing practices, marketing procedures, and the environment.
- Objective 15. Avoid unnecessary adverse impacts on small entities.
- Objective 16. Consider the importance of groundfish resources to fishing communities, provide for the sustained participation of fishing communities, and minimize adverse economic impacts on fishing communities to the extent practicable.

Objective 17. Promote the safety of human life at sea

In addition to these objectives, the Council is currently in the process of developing a fisheries rationalization amendment which, if adopted, would create a trawl individual quota (TIQ) management system for the US Pacific hake fishery, paralleling closely Canada's IVQ program.

Several advisory bodies provide socio-economic input to the Council including the Groundfish Advisory Committee, the Groundfish Management Team, and the Scientific and Statistical Committee. Council staff and the National Marine Fisheries Service routinely incorporate socio-economic impact analysis as a part of Environmental Impact Statement analysis on fisheries plan amendments and biennial fisheries specification documents[lxxv].

Canadian Fishery

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

In Canada, The IVQ/GDA plan contains a specific mechanism – the Groundfish Development Authority (GDA) - to promote socio-economic benefits in the hake fishery. The GDA influences allocation of 10% of the annual hake quota. This 10% quota "holdback" is called the Groundfish Development Quota (GDQ). In order to gain access to GDQ, vessels commit their (90%) IVQ holdings to a vessel-shoreside processor proposal. Proposals deemed to meet the socio-economic objectives of the GDA are rewarded with an allocation of GDQ approximating 10%. (see GDA Operational Plan).

The objectives of the GDA are (paraphrased):
Market stabilization
Maintain existing onshore processing capacity
Employment stabilization
Economic development and benefits in coastal communities
Increasing the value of groundfish and hake production
Industry training opportunities
Sustainable fishing practices
Periodic review and evaluation of the GDA program has found the initiative to have had a significant positive socio-economic impact including benefits to coastal communities.

The IVQ/GDA plan is essentially an incentive-based Individual Transferable Quota program, encouraging individual accountability and responsibility. By eliminating the race for fish, participants are motivated to optimize the socio-economic benefits obtainable from a fixed quantity of fish, versus merely trying to secure more fish. The IVQ/GDA plan is a unique plan that explicitly seeks to ensure a fair and equitable distribution of the socio-economic benefits accruing from the BC groundfish/hake fishery.

An additional mechanism within the management system to address socio-economic impacts is the In-season Hake Advisory Committee (IHAC). This consultative body composed of all stakeholder groups and the Province of BC annually considers the domestic allocation (onshore processing and Joint Venture) approach deemed to best meet the needs of all users. IHAC is further described in subsequent responses.

Scoring Rationale: There is limited entry in both fisheries. A score of 100 is appropriate for Canada as it demonstrates a most comprehensive process to account for socio-economic impacts. A score of 85 is appropriate for the US until the trawl individual quota (TIQ) management system is approved and implemented.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

3.1.4 (*Relates to MSC Criteria 3.2, 3.7*)	Procedures exist for measuring management performance relative to the objectives.	• Measures are used to gauge fishery management performance relative to objectives.	• Periodic, comprehensive measurement of performance indicators is undertaken. • Management measures are adjusted to meet objectives when necessary.	• Procedures are used for regular empirical measurement of performance relative to the objectives. • There is a regular process for adapting management measures when objectives are not being met.
Weight		**26.5**	**Score**	**US=90 CAN=90**

Client:

US Fishery

US Pacific hake fishery performance relative to fishery objectives is monitored by the Council, its advisory bodies[lxxvi], and NMFS. Harvest specifications for the fishery are set biennially, but adjusted within each fishing season as required to meet performance objectives. Advisory bodies responsible for monitoring fishery performance and making recommendations to the Council include:

- The Groundfish Management Team (GMT) – composed of state, federal, and tribal fishery management representatives. In addition to monitoring the performance of the Pacific hake fishery, they also track incidental catch and rebuilding objectives using an in-season bycatch 'scorecard'[lxxvii].
- The Groundfish Advisory Subpanel (GAP) – composed of three fixed gear (at-large) commercial fishers, one conservation representative, two processors, one at-sea processor, three sport fishers, two open access fishers, three trawlers, one tribal representative, and four charter boat operators (one for Oregon and Washington, one for northern California, and one for southern California).
- The Scientific and Statistical Committee (SSC) - is a group of scientists from state and federal agencies, academic institutions, and other organizations selected by the Council. They assist in the preparation and review of plan amendments and other documents, and identify scientific resources needed to carry out fishery management and monitoring.
- In addition to the above advisory bodies, the Council also relies on Enforcement Consultants, the Habitat Committee, and the Groundfish Allocations Committee for input on fishery performance[lxxviii].

Canadian Fishery

Within British Columbia, the hake fishery, managed by DFO, includes three stakeholder advisory processes for reviewing and evaluating achievement of objectives pre-season, in-season, and post-season.

The Groundfish Trawl Advisory Committee (GTAC) – representatives from fishermen, processors, labour, the GDA, and the Province of BC provide input to DFO on matters relevant to the fishery. A Hake Sub-committee of GTAC meets as required to consider hake-specific matters.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

In-Season Hake Advisory Committee (IHAC) – this committee includes all stakeholders in the hake fishery; in addition to those groups represented in GTAC are representatives from individual coastal communities and the Coastal Communities Network (CCN). This committee formally evaluates the hake fishery – pre-season, in-season, and post-season – and, by consensus, makes recommendations to DFO on management actions consistent with achievement of common objectives.

Groundfish Integration Advisory Board (GIAB – formerly Commercial Groundfish Integration Advisory Committee) – this body is comprised of representatives from the Province of BC, each of the BC groundfish fisheries (trawl, halibut, sablefish, rockfish, lingcod, dogfish) as well as from the recreational, environmental, and First Nations sectors. This Board considers over-arching policy and inter-sector issues affecting the groundfish fishery.

Each of the above stakeholder processes provides an element of evaluation of achievement of objectives, and exerts influence in the management system adapting appropriate measures to achieve evolving objectives. The process is designed to be transparent and open. The committees are composed of industry elected representatives and allow observers.

This is a very transparent, open process, as these committees consist of representatives selected by industry sectors, active processors, and other stakeholder organizations (ie Coastal Communities Network). In addition, these advisory processes are open to public observers. There are periodic reviews and oversight that is described in section 3.3.1.

Within DFO (internal), there is an ongoing process of reviewing performance of the fishery – using a variety of scientific and socio-economic indicators – and revising approaches as necessary. The BC hake exploitation strategy is multi-faceted, ensuring adaptive and responsible harvest of stocks. The exploitation rate will be governed by the (soon to be ratified) Canada/US Hake/Whiting Agreement. The exploitation approach subscribed in the Agreement recognizes “uncertainties in stock assessment and stock productivity parameters.” The default exploitation rate applied in the management system is F_{40} with a 40/10 adjustment. This approach is designed to maintain the biomass at sustainable levels, while reducing the exploitation rate if the biomass falls below 40% of the un-fished levels to prevent over-harvesting and ensure stock recovery. The annual TAC for the stock, to be set through the joint technical, science, and management processes set out in the Agreement, is divided according to the formula: USA 73.88%, Canada 26.12%.

Confirming a precautionary approach in practice, both Canada and the US have adopted OYs or TACs lower than that indicated by the F_{40} approach in recent years, to consider uncertainty and volatility in stock abundance estimates.

The exploitation strategy for harvesting the Canadian hake TAC includes a variety of mechanisms including time and area closures and gear/mesh restrictions, but most importantly, the Individual Vessel Quota (IVQ) management plan. The IVQ system:
Slows down the fishery, eliminating incentives to “race for fish” that may work counter to vessel/crew safety, conservation and ecological objectives.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Eliminates the potential for over-harvest; the IVQ plan is accompanied by a comprehensive monitoring program to ensure compliance.

Results in accurate tallies of the commercial catch.

Provides a great deal of data on catch composition, size, and location; also, provides extensive biological samples.

Encourages full utilization of catch (minimizes incidence of at-sea releases).

Imposes individual harvester accountability and responsibility for catch.

The IVQ program has led to fishermen altering their fishing practises, by utilizing shorter tow times, avoiding areas where there is known presence of bycatch/juvenile fish and sharing of information with others in the industry to reduce bycatch (non-directed) levels.

Improves the quality and value of hake products

International

The exploitation strategy applied in the US and Canadian Pacific hake fishery provides explicitly for exploitation rates to vary according to the best available science coupled with a precautionary approach, and a harvest strategy that ensures adherence to OYs and TACs for both target and non-target species.

At the international level, the Canada/US Hake/Whiting Agreement specifies processes for ensuring conservation-based management of the trans-boundary hake stock, including:

A Joint Technical Committee (JTC) – comprised of five scientific experts to provide a stock assessment considering all relevant factors and risk parameters.

A Scientific Review Group (SRG) – comprised of up to six independent scientific experts (different than those on the JTC) to provide peer review of the work of the JTC.

A Joint Management Committee (JMC) – comprised of four members from each Party, to review the advice of the JTC and SRG, and provide advice on an overall TAC.

An Advisory Panel – with members from both parties, to make recommendation to the JMC regarding the overall TAC.

The Canada/US Hake/Whiting Agreement, with its various processes and committees, ensures an ongoing process of measuring performance relative to objectives.

Scoring Rationale: A score of 90 is appropriate for the US and Canadian fisheries. Both set TACs and bycatch caps, corresponding to short term objectives. The fisheries are monitored in-season to ensure that both bycatch and target species catch objectives come as close as possible to being met. For example fisheries are moved offshore to avoid salmon bycatch in certain areas, based on in-season evaluation of monitoring data. A higher score would be warranted it there was full implementation of the Canada/US Hake/Whiting Agreement.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

3.2 TAVEL Criterion 2	The management system recognizes applicable legislative and institutional responsibilities and coordinates implementation on a regular, integral and explicit basis.		
Weight	**10.5**	**Score**	
Weighting Rationale	PI 3.2. 1 is more important than PI 3.2.2 due to the international and tribal aspect of the fishery.		

3.2.1 *(Relates to MSC Criterion 3.16)*	The fishery is managed and conducted in a manner that respects international conventions, treaties, and domestic laws related to the hake fishery.	• The management system makes consistent efforts to operate in accordance with all substantive and procedural aspects of applicable conventions, agreements and law. • No violations have been identified that would jeopardize the management of fisheries resources.	• The management system is in compliance with all substantive and procedural aspects of applicable conventions, agreements and law.	• The management system is clearly in compliance with all procedural aspects of applicable conventions, agreements and law which can directly be applied to the hake fishery. • No agent of the management system, including its component institutional entities, has been found to be in violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the fishery.
Weight		**60.0**	**Score**	**US=95 CAN=95**

Client:

US Fishery

The Pacific hake fishery is a federally managed species and is subject to a host of domestic laws emerging from the Magnuson-Stevens Act. Bycatch species encountered in the fishery are subject to several federal acts and applicable laws including the Endangered Species Act, Marine Mammal Protection Act, and Marine Bird Treaty Act. Shoreside hake activities are regulated by state fish and wildlife rules and rules promulgated by the departments of ecology or environmental quality (depending on the state). Marine pollution (MARPOL) is covered under international convention[lxxix].

The US Council seats tribal representatives who participate in the Council process and act in a manner consistent with Council recommendations in compliance with treaty obligations and federal law. State laws are consistent with federal laws governing this fishery (see

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

3.2.2 below). The management system is an open, transparent system with multiple checks and balances, institutions and individuals. No agent of the management system, including its component institutional entities, has been found at any time to be in violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the fishery.

No agent of the management system, including its component institutional entities, has been found at any time to be in violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the fishery.

Canadian Fishery

The Canadian Pacific hake fishery is subject to several federal laws (See section 2.1.5.2 for a complete list). Fisheries management emerges from the Fisheries Act. Endangered or threatened species that might be encountered in the fishery are afforded protection under the Species at Risk Act (SARA). The Coastal Fishery Protection Act and Regulations in Canada allows requirements on the Joint Venture (JV) fleet that may be more restrictive than those for domestic fishing vessels. Shoreside vessels are also subject to Provincial Acts and regulations.

The management system is clearly in compliance with all substantive and procedural aspects of applicable conventions, agreement, and law. No agent of the management system, including its component institutional entities, has been found at any time to be in violation of any order of any domestic court of jurisdiction on any matter related to performance of any statutory duty concerning the fishery.

International

Since 2004, the Pacific hake fishery has been managed in the spirit of an international treaty being developed between the United States and Canada[lxxx]. At present, the Agreement with Canada on Pacific Hake/Whiting has been ratified by the United States and has been presented to the Canadian Parliament for ratification this year.

The US and Canada are signatories to the Pacific Salmon Treaty and to international treaties regulating marine pollution (MARPOL).

Scoring Rationale: A score of 95 is appropriate for both the US and Canadian fishery management systems. They operate in close coordination at the international level, as well as respect state, and provincial laws and cooperative implementation of tribal treaties. A higher score would be warranted if there was full implementation of the Canada/US Hake/Whiting Agreement.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.2.2 *(Relates to MSC Criterion 3.1)*	The fishery is managed and conducted such that state and provincial requirements fit with the federal regulatory standards for the fishery as per the applicable national acts.	• Applicable state or provincial regulations are consistent with the key requirements of the federal act (s).	• Applicable state or provincial regulations implicitly incorporate the requirements of the federal act(s).	• Applicable state or provincial regulations explicitly incorporate and is in compliance with all aspects of the federal act(s).
Weight		**40.0**	**Score**	**US=100 CAN=90**

Client:

US Fishery

In the US, applicable state regulations governing the Pacific hake fishery incorporate rules which either cite the Code of Federal Register CFRs refer to federal regulations or are otherwise consistent with federal rules and regulations[lxxxi]. States are voting members of the Council and all associated management bodies. Advice and consent emerges from active participation of stakeholders and though advisory bodies.

Canadian Fishery

Likewise, in British Columbia, applicable provincial regulations explicitly incorporate and are in compliance with all aspects of the federal acts. DFO synthesizes the information and advice received and, applying a precautionary approach to resource management, renders decisions. DFO accords a very high weighting to advice that is forwarded through consensus processes such as GTAC, GSIC and IHAC (See 3.1.4 above).

Scoring Rationale: A score of 100 is appropriate for the US fishery because state regulations are explicit and consistent in compliance with federal regulations. In Canada, provincial jurisdiction is from the shore, landward. The Compliance Division of the Province of British Columbia Ministry of Environment provides ministry-wide leadership and services in support of compliance management. It does this through the work of two branches, the Conservation Officer Service and the Compliance Policy and Planning Branch. The Division provides ministry-wide expertise in environmental investigations and enforcement responses to non-compliance, and liaising with other government agencies (including DFO) on compliance and enforcement issues, and facilitating opportunities for partnering with sector associations on compliance efforts.

A score of 90 for the Canadian fishery is appropriate because, while regulations explicitly incorporate aspects of the federal acts, compliance/coordination could be improved. Currently, DFO must proceed through provincial courts to prosecute offenders of the Fisheries Act or its regulations. This is a slow and costly process. In a number of jurisdictions, there are no arrangements to handle the issuing of tickets for minor violations. The courts have significantly limited the Minister's ability to impose license sanctions. In addition, the Minister's power under

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

the Act to suspend or cancel a license is ineffective. Several intergovernmental arrangements are in place although there has never been an overarching legal framework to establish common goals between the two levels of government or to secure the consistency of these arrangements (URL: http://www.dfo-mpo.gc.ca/media/back-fiche/2007/hq-ac59c-eng.htm, visited 9/26/08).

3.3 TAVEL Criterion 3	The management system includes a rational and effective process for acquisition, analysis and incorporation of new scientific, social, cultural, economic and institutional information.		
Weight	**10.5**	**Score**	
Weighting Rationale	PI 3.3.2, presentation of clear and useful information, is more important than 3.3.1 and 3.3.3, which are of equal importance.		

3.3.1 *(Relates to MSC Criterion 3.2)*	The management system solicits and assesses relevant information from all categories of stakeholders.	• The management system has mechanisms to receive information and policy recommendations from stakeholders and technical sources within and external to the fishing community. • Information and advice is evaluated but there are no formal procedures for responding to such information and advice.	• The management system has a formal and open process to solicit and receive relevant information and policy recommendations from all significant public and private stakeholders. • The management system has explicit procedures for assessing and incorporating information from outside sources and does not discriminate against information on the basis of the stakeholder category from which it was supplied.	• The management system has a stable, well-led, predictable, open and tolerant process to solicit relevant information from public and private stakeholder interests. • There is an active program of familiarizing stakeholder groups with the management system's principles and criteria for decision making. • The management system is periodically reviewed to ensure that relevant outside stakeholder interests are considered and incorporated into the decision process.
Weight		**28.6**	**Score**	**US=100 CAN=100**

Client: The management system relies strongly on advisory and consultative processes that include all categories of stakeholders. The stakeholder forums providing information and advice to NMFS and DFO are the same as those outlined in 3.1.4 above.

US Fishery

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

In the US, the PFMC process is the primary means for soliciting stakeholder information important to the Pacific hake fishery. The Council develops a meeting agenda and prepares a briefing book on issues of concern to Fisheries Conservation Zone (FCZ) management, including trans-boundary issues. Stakeholders are encouraged to prepare written and oral testimony on these issues. Written testimony submitted before briefing book deadlines is incorporated into the briefing book. Stakeholders can also provide public comment during the Council meeting. Finally, advisory bodies such as the GMT, GAP, and SSC, provide briefing reports and comments to Council members during the meeting. Council guidelines encourage consensus reporting, however when there is a lack of consensus, advisory bodies provide minority reports[lxxxii]. Council recommendations are made to NMFS and are subject to NEPA requirements and regulatory analysis.

Canadian Fishery

In Canada, the GTAC advisory body for the groundfish trawl fishery includes representatives from: licence holders, processors, the Provincial Government, fishermen's organizations (Deep Sea Trawlers Association), the Groundfish Development Authority, the Canadian Groundfish Research & Conservation Society, and the United Fishermen and Allied Worker's Union. Where appropriate, representatives are elected bi-annually by their constituents, or alternatively, are appointed by their organizations.

GTAC routinely receives presentations and engages in discussions with other interests in the fishery, for example environmental organizations, research organization (e.g. projects such as hydro-acoustic testing), stock assessment authors, and private firms exploring projects that may impact the fishery (e.g. fiber optic cables, windmill "farms).

A sub-committee of GTAC, the Groundfish Special Issues Committee (GSIC) is composed of eight "signatory" representatives (2 fishermen, 2 processors, 1 union, 1 Coastal Communities Network, 1 DFO, and 1 Province of BC). This committee tackles complex issues requiring a dedication of study and analysis. Among the projects completed by GSIC:

- Periodic reviews of the effectiveness of the IVQ/GDA Plan (1999, 2002, and 2003) in meeting conservation and socio-economic objectives, including recommendations for alterations to the Plan (with these recommendations subsequently implemented by DFO).
- Periodic advice to GTAC/DFO on elements of the plan requiring "fine-tuning", such as transferability rules, species and holdings caps, and licence length restrictions.

All GSIC recommendations are reached through consensus, ensuring a balance of the diverse interests of stakeholders in the groundfish trawl/hake fishery.

IHAC, the advisory body dealing with in-season use of hake, in addition to the Province and stakeholders represented in GTAC, further includes representatives from the Coastal Communities Network (CCN) and individual west coast communities. IHAC is a consensus based process, requiring all members, representing all significant stakeholders, to agree prior to forwarding advice to DFO. IHAC is a highly inclusive body whose advice is given substantial weight in the DFO decision-making process. IHAC is a committee whose stature has grown in recent years in response to the growing profile and economic importance of the hake fishery.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

GIAB – the over-arching integrated groundfish board - provides a forum for other groundfish sectors (halibut, sablefish, rockfish, lingcod, and dogfish) to provide input on the groundfish trawl (including hake) fishery; it provides a similar forum for other stakeholder groups, such as recreational, First Nations, and environmental groups.

The advisory bodies described above have evolved over time to meet stakeholder and DFO requirements. DFO regularly reviews the membership structure and Terms of Reference for these committees to ensure their ongoing effectiveness and relevance[lxxxiii]. PSARC incorporates user input and follows a precautionary management approach to set TACs The Pacific Scientific Advice Review Committee (PSARC) is the Pacific Regional body responsible for review and evaluation of all scientific information on the status of living aquatic resources and biological aspects of stock management. PSARC undertakes a scientific peer review and advisory process in order to provide internal and external Clients with scientific information and advice that is reliable, relevant, timely and comprehensive. PSARC advises the Resource Management Executive Committee (RMEC) and the Regional Management Committee (RMC) of Fisheries and Oceans Canada and other bodies on stock and habitat status and potential biological consequences of fisheries management actions and natural events (See section 3.1.2 above)[lxxxiv].

Scoring Rationale: Because of the extensive protocols for timely inclusion of information from all categories of stakeholders, both in the US and Canada, a score of 100 for both is justified. The Canadian process is well documented above.

In the US, the management and assessment process is mediated through the Pacific Fishery Management Council, which is an open public process that is noticed through published notices in the *Federal Register*, mailings to stakeholders on the Council's groundfish mailing list (about 600 stakeholders), and posted announcements on the Council's web site. The peer review process for new assessments is similarly noticed and stakeholders are invited to contribute to assessment review meetings. Further assessment review by the Council's SSC is a public process where stakeholder input is solicited. Finally, public input is solicited before a decision is made by the Council on whether to adopt a new assessment. For example, three independent hake assessments were done last year and all three were formally reviewed by the Stock Assessment Review Panel. All three assessments, a minority report by a scientist who attended the review panel, and a rebuttal to the minority report were provided for SSC and Council consideration before an assessment was recommended by the SSC and adopted by the Council. All stakeholder input was considered before this decision was made. The same level of stakeholder/public input is solicited before any management decisions are made by the Council.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.3.2 *(Relates to MSC Criterion 3.2)*	The management system presents decision makers with clear, useful, and relevant information about policy options and their likely consequences.	• The management system presents decision makers with clearly differentiated policy alternatives for action. • Decision makers analyze formal and informal information to predict the consequences of various options and discriminate among them to determine best actions.	• Policy options are responsive to relevant stakeholders via a process prescribed by fisheries management law and procedures. • The management system's decision makers show evidence of understanding and consistently incorporating the information provided to them. • Technical information reflects the most recent and rigorous scientific understanding.	• The management system provides timely and comprehensive information to decision makers. • Information gaps and uncertainties are clearly described and presented to decision makers.
Weight	**42.9**	**Score**	**US=95 CAN=95**

Client:

US Fishery

See 3.1.4 and 3.3.1 above. In the US, the PFMC staff, advisory bodies, and NMFS is responsible for preparation of status of stock documents, biennial specifications for fishery management, and, when needed, amendments to the fisheries management plan affecting the Pacific hake fishery. Stock assessments are prepared using Council adopted Terms of Reference[lxxxv] and incorporate a formal review process through the use of a stock assessment review process (STAR). The STAR process incorporates Terms of Reference and has the following goals and objectives:

a) Ensure that groundfish stock assessments provide the kinds and quality of information required by all members of the Council family.
b) Satisfy the Magnuson-Stevens Sustainable Fisheries Act (SFA) and other legal requirements.
c) Provide a well-defined, Council-oriented process that helps make groundfish stock assessments the "best available" scientific information, and facilitates use of the information by the Council. In this context, "well-defined" means with a detailed calendar, explicit responsibilities for all participants, and specified outcomes and reports.
d) Emphasize external, independent review of groundfish stock assessment work.
e) Increase understanding and acceptance of groundfish stock assessment and review work by all members of the Council family.
f) Identify research needed to improve assessments, reviews, and fishery management in the future.
g) Use assessment and review resources effectively and efficiently.

The stock assessment forms the basis for setting recommended harvest management policies[lxxxvi]. An analysis of options and their potential impacts is presented in the biennial specifications document[lxxxvii]. Options for management are clearly laid out, incorporate biological, social, and economic impacts, and conform to national standard guidelines, NEPA requirements, and regulatory flexibility analysis. Decision making

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

by the Council is informed through the use of these documents, NMFS legal counsel, testimony by advisory bodies, and through public testimony.

Canadian Fishery

In Canada, the management system presents decision makers with a host of information from a suite of sources including industry and other stakeholders (through the GTAC, GSIC, IHAC, and GIAB committees), through government scientific processes such as PSARC (Pacific Science Advice and Review Committee.) and through environmental channels such as COSEWIC (Committee on the Status of Endangered Wildlife in Canada).

Generally, input from advisory bodies and processes are provided to DFO in the form of consensus recommendations (including options) and supporting rationale. Thus the input is clear, useful, and relevant to DFO, and covers a broad range of conservation and socio-economic interests. DFO synthesizes the information and advice received and, applying a precautionary approach to resource management, renders decisions. DFO accords a very high weighting to advice that is forwarded through consensus processes such as GSIC and IHAC.

International

At the international level, the Canada/US Hake/Whiting Agreement specifies processes for ensuring conservation-based management of the trans-boundary hake stock. See 3.1.4 above.

Scoring Rationale: A score of 95 is justified for both US and Canada. All information regarding uncertainties and management option consequences could be more comprehensively described, but presented in more lay terms to decision makers, to justify a perfect score of 100.

3.3.3 *(Relates to MSC Criteria 3.2, 3.5)*	The management system provides for timely and fair resolution of disagreements arising within the fishery management system, including any disputes with third parties.	• Informal dispute resolution mechanisms are in place to resolve interjurisdictional or third party conflicts. • Mechanisms are adequate for significant issues but have not been applied consistently or tested.	• The management system has codified mechanisms for timely resolution of significant disputes arising within or external to the system. • The established dispute resolution mechanisms are open, transparent and are generally considered by stakeholders to be effective.	• The management system documents the nature and disposition of disputes. • The mechanisms are tested and show no evidence of a pattern of discrimination against any participants in other jurisdictions or significant stakeholder interest.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Weight	28.6	Score	US=95 CAN=80

Client:

US Fishery

In the US, the Council relies on a consensus approach among advisory bodies with room for minority reports should these groups fail to reach consensus[lxxxviii]. The Council itself votes on options after weighing staff reports, advisory body reports, NMFS legal counsel advice, and public testimony. Legal action may also used by those individuals or groups dissatisfied with the decisions made by the Council and NMFS.

Canadian Fishery

As indicated previously, some of the most important advisory bodies in the management system in Canada (CTAC, GSIC, IHAC) operate under a consensus decision-making model, meaning that disputes must be resolved internally before advice can be forwarded to DFO. Stakeholder consensus is an increasingly important part of the management decision-making system. Dispute resolution mechanisms are not currently an explicit part of the Canadian fishery management system. The GIAB terms of reference are being developed and are expected to include dispute resolution procedures.

The IHAC is a committee established and chaired by DFO which encompasses all stakeholders. The committee reviews disputes and using a fair and open consensus process, resolves them. Although the process can be time consuming, it has been able to provide advice used to manage the fishery successfully for the last 4 years.

The nature of the Canadian fishery management system is that DFO, through the Minister of Fisheries, maintains full discretion over management of fisheries, including resolution of disputes arising from advisory body decisions. Legal remedies are available to citizens disputing Ministerial decisions through the court systems.

Scoring Rationale: As score of 95 is appropriate for the US, but there is still a need for a method to test mechanisms to show no evidence of a pattern of discrimination against any participants in other jurisdictions or significant stakeholder interest. The nature of disputes is well documented in the following discussion that details cases related to West Coast hake management and their final adjudication.

1) Mid-water Trawlers Cooperative v. Evans: This case was originally a consolidation of four cases (two from 1996 and two from 1999) disputing a Council/NMFS tribal allocation scheme for hake. The case was originally ruled in favor of NMFS and affirmed treaty rights to the hake fishery, the “usual and accustomed” tribal fishing areas extend beyond the three mile limit of the territorial limit of Washington’s coast, the tribe’s role of co-manager, and the sliding scale hake allocation formula negotiated with the tribes and NMFS. The case was appealed to the Ninth Circuit, which affirmed the rulings in the lower court case, but remanded to NMFS the sliding scale allocation piece. The remand was to provide the courts with further justification that the sliding scale allocation formula represented the best available science and conformed to the Magnuson-Stevens Act and the Treaty of Neah Bay. NMFS supplemented the administrative record regarding the sliding scale allocation agreement and

the court ruled in 2002 that the Secretary of Commerce acted within his authority in deciding the sliding scale allocation and the allocation method represented the best available science.

2) Starbound, LLC and West Coast Fishery Investments, LLC v. Gutierrez: Prior to implementation of Amendment 15 to the Groundfish FMP, which limits participation by sector to the West Coast hake fishery to vessels that had a catch history, the Council requested in 2007 an emergency rule to bar new entrants to the 2007 hake fishery. The Starbound, a catcher-processor trawler that fished extensively in Alaska fisheries with American Fisheries Act privileges in the pollock fishery, had made plans to enter the West Coast hake fishery in 2007 and purchased the requisite number of trawl permits to do so. The emergency rule was requested by the Council and implemented to prevent disruption to the 2007 fishery (concerns were raised that the Pacific Whiting Cooperative could collapse with a new entrant to the catcher-processor sector and new entrants without knowledge of the fishing grounds could have a higher bycatch rate of species managed with strict bycatch limits), which prevented participation by the Starbound. Starbound, LLC challenged the temporary emergency rule in District court. The court decided that NMFS acted rationally and within the authority of the Magnuson-Stevens Act and the Administrative Procedure Act standard of review in implementing the emergency rule. NMFS then allowed Starbound to divest their permit holdings and no challenge was mounted by the plaintiffs for the 2008 hake fishery.

3) Natural Resources Defense Council, et al. v. Gutierrez: NRDC has mounted a number of challenges to Council groundfish rebuilding plans and annual decisions regarding groundfish harvest specifications and management measures dating back to 2001. These cases have been consolidated and heard in the Ninth Circuit Court of Appeals. While this litigation did not directly challenge the management decisions for the hake fishery, challenges to rebuilding plans can have a direct effect on West Coast hake management.

The latest lawsuit heard in the Ninth Circuit Court of Appeals was a challenge to the Council and NMFS's darkblotched rockfish rebuilding plan that essentially claimed the harvest rate was too high and the rebuilding period too long and not justified by the analysis and information provided in the EIS that analyzed the rebuilding plan. The Council and NMFS pursued and adopted Groundfish Amendment 16-4 that updated analyses and rebuilding plans with a stronger analysis of biological and community impacts. Before Amendment 16-4 was implemented, the Ninth Circuit Court affirmed that some incidental harvest of overfished species can be allowed in a rebuilding plan to avoid significant negative impacts to coastal communities. Litigation is still ongoing and the Council and NMFS are still awaiting a ruling on Amendment 16-4.

For the Canadian fishery a score of 80 is appropriate because dispute resolutions follows from the Fisheries Act, "Fishery leases and licences" section, which states:

"7. (1) Subject to subsection (2), the Minister may, in his absolute discretion, wherever the exclusive right of fishing does not already exist by law, issue or authorize to be issued."

Within this "absolute discretion, the Minister's office established "A Policy to Govern Pacific Region Advisory Bodies" in 2004. The policy contains:

- Specific guidelines on the requirements related to mandate, structure, membership, roles and responsibilities, procedures and rules of

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

engagement (committee charter) of Fisheries and Oceans Canada (DFO) Pacific Region's many advisory bodies;
- Guidance for regular evaluation of advisory bodies based on performance measures;
- A consistent approach and procedures; and
- Specific direction on the use of advisory bodies as part of the Department's broader consultation and citizen engagement objectives, contained in DFO's National Consultation Framework.

The advisory bodies mentioned above provide detailed analyses for project issues, and participants gain understanding of other perspectives, leading toward compromise.

A score higher than 80 could be achieved if evidence is provided describing a method to test mechanisms to show no evidence of a pattern of discrimination against any participants in other jurisdictions or significant stakeholder interest.

3.4 TAVEL Criterion 4	The management system and fishery implements measures and strategies (by rule or by voluntary action of the fishery) that demonstrably reduce by-catch, destructive fishing practices and operational waste.		
Weight	**14.5**	**Score**	
Weighting Rationale	Gear restrictions and practices to minimize bycatch (PI 3.4.1) is significantly more important than minimizing operational wastes (PI 3.4.3) which is more important than destructive fishing practices (PI 3.4.2).		

3.4.1 *(Relates to MSC Criterion 3.10, 3.12)*	The management system applies gear restrictions and mandatory practices to minimize bycatch where necessary.	• The fisheries management system has implemented measures for minimizing bycatch. • Qualitative evidence from at-sea and dockside observations indicates some success in reducing bycatch.	• The management system uses a formal and comprehensive program to reduce bycatch to acceptable levels, including explicit bycatch objectives. • There is independent evidence of fishery-wide adoption of measures undertaken to reduce by-catch.	• The management system has achieved fishery-wide acceptable by-catch objectives. • The management system has statistically demonstrated the effectiveness of bycatch reduction measures through independent at-sea measurement.
Weight		**49.8**	**Score**	**US=80 CAN=90**

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client:

US Fishery

In the US, the management system explicitly incorporates bycatch and waste reduction and mitigation through gear restrictions and other mandatory practices outlined in the groundfish FMP its amendments. A bycatch amendment was implemented in 2006 to minimize bycatch and provides the following management system described within the FMP[lxxxix]. Goals and objectives for fisheries utilization were modified to:

- Encourage development of practicable gear restrictions intended to reduce regulatory and/or economic discards through gear research regulated by EFP (FMP Objective 8).
- Develop management measures and policies that foster and encourage full utilization (harvesting and processing), in accordance with conservation goals, of the Pacific Coast groundfish resources by domestic fisheries (FMP Objective 9).
- Define a total catch limit for fishery sectors to include retained catch and discard (Section 2.2).
- Develop a standardized total catch reporting and compliance monitoring program (FMP Section 6.4).
- Develop a bycatch mitigation program (FMP Section 6.5) which includes an extensive set of tools to reduce bycatch and bycatch mortality.

See sections 2.1.2.1, 2.1.2.2 and 2.1.2.4 for a description of US programs to monitor and control total catch and to provide incentives for minimizing bycatch and bycatch mortality.

These programs encourage the avoidance and better utilization of bycatch through:

- Mandatory gear and mesh restrictions to allow escapement of juvenile hake and small non-target species[xc].
- Mandatory area closures (see sections 2.1.2.1 and 2.1.2.2 above).
- At-sea and shoreside observer programs (see 2.1.2.1, 2.1.2.2, and 2.1.2.4 above for description). Bycatch is monitored through 100% observer coverage aboard at-sea catcher processor vessels and motherships by the West Coast Groundfish Observer Program[xci] and through a shoreside monitoring program which samples catch and bycatch which is brought to shore and sorted[xcii].
- A sector-based "scorecard" total catch method of monitoring and controlling bycatch[xciii]. This system is not an individual vessel system like Canada's but accomplishes similar bycatch reduction goals by placing sector caps on bycatch species of particular concern. An individual trawl vessel quota system for US fisheries is currently being considered through an FMP plan amendment process.
- Bycatch is managed to provide incentives for retention and accounting of salmon and overfished groundfish species[xciv].

Canadian Fishery

The management system in Canada encourages practices to minimize bycatch in two key ways:

- Restrictions to encourage avoidance of bycatch:

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Gear and mesh restrictions are in place to facilitate escape of juvenile fish and/or non-target species. Gear/mesh restrictions are outlined in Section 7 of the Groundfish Trawl appendix of the IFMP (pages 15-17)[xcv]. Mesh restrictions may vary according to fishing area, reflecting varying species mixes and abundances. In the hake fishery, those vessels delivering to a Joint Venture vessel must utilize an escape panel to permit release of unwanted fish. (Section 7.2.2.1 p 16). Gear/mesh restrictions are clearly specified in each licence-holder's "conditions of licence" documentation.

Area closures – as indicated in Criteria 3.1.4, the management system utilizes a system of area closures (either seasonal or year round), in part to facilitate avoidance of non-target species in trawl fisheries.

At-sea observer coverage – the level of at-sea observer coverage in the hake fishery varies according to the incidence of non-target species. Vessels fishing in areas known (or observed) to have greater non-target species abundance feature 100% at-sea observer coverage. Observer coverage is described in greater detail in 3.6.1 below.

- Incentives to encourage utilization of bycatch (non-target species)

The key features of the management system are incentives to utilize all non-target catch. The exception is Pacific halibut, which is a non-retention species. Most of the species that may be encountered during hake fishing are managed under the IVQ system – that is, harvesters possess an individual quota for these species. Quantities of non-target IVQ species that are caught incidental to the hake fishery are deducted from a vessel's IVQ holdings. This provides a powerful incentive to retain (utilize) all catch.

For species that are not managed under the IVQ system, such as mackerel, catch allowances are in place; for instance, a vessel may land mackerel up to 6% of the weight of hake harvested in each fishing trip.

The non-target species catch allowance guidelines are quoted form the Offshore Hake Harvest Plan as follows:
"The retention of groundfish, other than sablefish, mackerel, walleye pollock and halibut, on non-observed dedicated Pacific hake mid-water trips can not exceed 10% of the weight of hake landed per trip. Catch allowances for sablefish and walleye pollock are 3% and 30% respectively of the hake landed per trip. The catch allowance for mackerel is 6% of the offshore Pacific hake on the vessel's groundfish trawl licence. There is no catch allowance for Pacific halibut, salmon species, green and white sturgeon, Pacific herring and wolf-eels Catch in excess of the above catch allowances must be relinquished. All catch, retained or relinquished, will be registered as catch against the vessel and applied against the vessel's IVQ holdings. Groundfish trawl licence holders are accountable for all groundfish catch and responsible for ensuring sufficient IVQ holdings to cover assigned catch is on the groundfish trawl vessel's licence".

The effect of the IVQ management system coupled with catch allowances (for individual non-target species and non-target species in aggregate) is that harvesters avoid areas of high bycatch incidence. Once fishing in areas with modest incidence of non-target species, they are motivated to retain all non-target species encountered.

Scoring Rationale: A score of 90 is justified for the Canadian fishery. A higher score would be achieved with 100% at-sea observer coverage and a study that statistically demonstrated the effectiveness of bycatch reduction measures through independent at-sea measurement.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

COSEWIC and participants in the IHAC (In season Hake Advisory Committee) process provide independent observations of fishery-wide adoption of measures undertaken to reduce by-catch.

For the US fishery a score of 80 is justified. The management system uses a formal and comprehensive program to reduce bycatch to acceptable levels, and has explicit bycatch objectives. Bycatch objectives, however, for prohibited salmon were exceeded in 2000 and 2005, and there likely have been some overages of catch limits of rockfish species with specific quotas that may not have been fully quantified due to gaps in the monitoring system. The management system has not provided a formal report that statistically demonstrates the effectiveness of bycatch reduction measures through independent at-sea measurement.

3.4.2 *(Relates to MSC Criterion 3.10, 3.14)*	The fishery does not use destructive fishing practices (e.g. poison, explosives).	• There is no evidence that destructive fishing practices take place within the fishery.	• Fishery management system does not allow the use of destructive fishing practices. • Monitoring and enforcement efforts are sufficient to identify a problem if it exists.	• Active monitoring and enforcement in the fishery has verified that no destructive fishing practices exist.
Weight		**21.7**	**Score**	**US=100 CAN=100**

Client:

US and Canadian Fishery

Mid-water trawling is the means used to catch Pacific hake, no poisons or explosives are used. Active monitoring and enforcement in the mid-water trawl fishery has verified that no destructive fishing practices exist.

Scoring Rationale: A score of 100 is justified for both fisheries because there is active monitoring for many years and there is no evidence of destructive fishing practices.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.4.3 *(Relates to MSC Criterion 3.15)*	The fishery minimizes operational wastes such as lost fishing gear, petroleum product leaks or discharges, on-board spoilage of catch, etc.	• The fishery management system has identified major examples of operational waste and communicated these to the fishery participants • Some fishery participants actively reduce operational wastes.	• The fishery management system has established targets and implemented rules to minimize operational wastes. • There is evidence that operational wastes have been reduced.	• The management system provides fishermen with incentives to minimize operational wastes. • Evaluation of the monitoring and enforcement programs demonstrates targets for reducing operational waste have been achieved.
Weight		**28.5**	**Score**	**US=90 CAN=90**

Client: The management system contains clear incentives to minimize operational waste.

On-board spoilage of catch in the US and Canada is not an issue, since the catch must be landed and processed immediately thus the hake fishery is effectively a day fishery – fish are harvested and either delivered to port the same day, or delivered instantly to a mothership (cod end lifted from water aboard processing ship). The nature of Pacific hake dictates that fish be chilled immediately upon capture and delivered promptly. This also ensures freshness and high-quality of any non-target species accompanying the hake catch[xcvi].

US Fishery

There are numerous State, federal, and international laws and regulations enforced by the U.S. Coast Guard regarding preventing oil spills, prohibitions on disposing of plastics and other materials, etc. The U.S. is a party to the International Convention for the Prevention of Pollution from Ships (MARPOL), a treaty that regulates the disposal of wastes generated by normal operation of vessels[xcvii]. Discharge logs must be maintained and dumping of oil, nets, gear, plastic, garbage, etc. is prohibited. The US coastguard enforces federal regulations in the FCZ and state fish and wildlife agencies regulate waste and pollution regulations in state waters[xcviii].

Shore based plants are in compliance as the States regulate their wastewater discharge by administering federal National Pollutant Discharge Elimination System (NPDES) permits under the auspices of the Environmental Protection Agency and the Clean Water Act[xcix].

US federally managed Pacific hake fisheries are also currently in the process of developing amendments to the federal FMP to rationalize the fishery under a TIQ program. The management system contains clear incentives to minimize operational waste.

Canadian Fishery

In Canada, under the IVQ/GDA plan harvesters have a clear and demonstrated interest in minimizing operational waste, since waste implies

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

costs. The IVQ/GDA plan provides incentives to derive maximum benefit from a fixed amount of fish (there is no "race" for fish), meaning improving revenues (including working toward full utilization of catch) and minimizing expenses (including fishing gear, fuel consumption, etc.). Canada is also a signatory to the International Maritime Organization's MARPOL treaty[c]. Discharge logs must be maintained and dumping of oil, nets, gear, plastic, garbage, etc. is prohibited.

Scoring Rationale: A score 90 is appropriate for both the US and Canadian fisheries. Some targets to minimize operational waste are qualitative. There are no reports of unrecovered lost fishing gear (all have been recovered), significant petroleum product leaks or discharges, or on-board spoilage of catch. There remains a concern regarding discarding of fish during final tows to top off the trip. This is a kind of operational waste, but there are indications that this practice is declining and will be further minimized with 100% at-sea monitoring. There needs to be a formal evaluation of the monitoring and enforcement programs to demonstrate targets for reducing operational waste have, in fact, been achieved.

3.5 TAVEL Criterion 5	A research program is conducted to support management needs.		
Weight	**10.5**	**Score**	
Weighting Rationale	PI 3.5.1, a research program which supports management was the most important PI and was slightly more important than PI 3.5.3, relevant research is carried out. PI 3.5.2 was the third most important and PI 3.5.4, timely research results was considered of least importance.		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.5.1 *(Relates to MSC Criterion 3.8)*	There is a research program that supports management of target species and protection of the ecosystem.	• Research supports short-term information needs for stock assessment and evaluation of effectiveness of harvest control measures. • Major areas requiring further research have been identified.	• The research program provides the management system with reliable, timely information on the status of the stocks and of other ecosystem indicators required for management. • There is internal review of the content and scope of the research program. • Longer term research periodically provides improvements in basic scientific understandings of the stock, ecosystem and fishery economics. • Research is planned and prioritized to address major gaps in knowledge.	• There are regular reviews of the content and scope of the research program by peer groups and stakeholders. • Research provides continuing, significant progress in scientific understanding of: 1) Fluctuations in target and impacted non-target species, 2) Effectiveness of harvest strategies, 3) Effects of fishing on the ecosystem, • Funding is adequate to address significant knowledge gaps, is adjusted in a timely and appropriate manner to serve changing research priorities, and is predictable over a long-term time scale.
Weight	**34.9**	**Score**	**US=95 CAN=95**

Client:

US Fishery

Research needs are reviewed and prioritized on a regular basis and as a part of routine stock assessment cycles. Each assessment and STAR panel report outline the specific research and data needs for that particular species. The Council also has a mandate (from the MSA) to deliberate R&D needs before making their recommendations to NOAA at least once every 5 yrs[ci].

Fluctuations in expected recruitment of Pacific hake is one focus area of research important to understanding future stock status and harvest levels as well as potential ecosystems impact. Another key research area focuses on bycatch reduction for overfished species taken in the Pacific hake fishery.

Within the US, there is a strong groundfish trawl research program that is conducted jointly by government and industry. Among the research

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

program elements:
Dedicated hake surveys.
Coastwide multi-species surveys (that furnish substantial information on hake distribution and abundance).
Surveys conducted by both government vessels/staff and under industry charters – mix of expertise.
Biological samples collected through the US shoreside monitoring program.
Data collected through the at-sea observer programs.
Through research efforts of the industry sponsored Pacific Whiting Conservation Cooperative.
Stock assessments benefit from a tremendous quantity of high-quality data, and are conducted in an open, inclusive, peer-reviewed manner (US STAT and STAR process).
Other academic and federal research programs on ecosystem dynamics within the Northern California Current Ecosystem.

Canadian Fishery

For the Pacific region (waters off British Columbia), there is a strong groundfish trawl research program that is conducted jointly by government and industry. Among the research program elements:
Dedicated hake surveys.
Coastwide multi-species surveys (that furnish substantial information on hake distribution and abundance).
Surveys conducted by both government vessels/staff and under industry charters – mix of expertise.
Biological samples collected through the Canadian shoreside monitoring programs.
Data collected through the at-sea observer programs.
Through the Canadian Groundfish Research and Conservation Society, industry provides funding support for research and stock assessment activities. Industry helps set research priorities. Industry provides both independent scientific expertise and provides partial funding for DFO science/management staff and programs
Stock assessments benefit from a tremendous quantity of high-quality data, and are conducted in an open, inclusive, peer-reviewed manner (BC PSARC process).

Generally, the research program is an efficient, effective, partnership between DFO and industry. The priorities for the research program are set strategically, with a view to filling information gaps and supporting an ecologically sustainable and economically viable fishery. Priorities and budgets are continuously revised to reflect the dynamic nature of fish resources and ecosystems, and socio-economic conditions in the groundfish fishery.

International

Under the Canada-US Hake/Whiting Agreement, processes for a joint research program are outlined. The Agreement confirms each country's ongoing commitments to hake science and research.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Scoring Rationale: A score of 95 is justified for both the US and Canadian systems. There are annual stock assessments, and oceanographic, spring wind patterns, larval survey studies that provide ecosystem indicators for management. Reviews of the research programs come out of the Council Groundfish Advisory Panel, the SSC, the STAR panel and PSARC process in Canada. NOAA economists look at the socioeconomic effects of the different management options in the RIR and EIS. The effectiveness of the harvest strategy in described in Punt et al.(2008). Results of several research studies continue to contribute to knowledge of the effects of the fisheries on the ecosystem, for example: Baraff and Loughlin (2000) and Wainstein (2006). The Canadian Policy branch looks at the fleet economics and considers recommendations by the GTAC and GSIC. Additional funding could better address the data gaps, but it may not predictable over the long-term.

3.5.2 *(Relates to MSC Criterion 3.17)*	Fishermen assist in the collection of catch, discard and other relevant data.	• Fishermen are involved in the collection of some catch, discard and other information.	• Fishermen are regularly involved in the collection and recording of relevant catch, discard and other information.	• Fishermen assist significantly in the collection and recording of all appropriate catch, discard and other information.
Weight		**21.5**	**Score**	**US=95 CAN=95**

Client:

US Fishery

US fishermen provide an extensive suite of information and data on catch, discard, and other relevant data (such as tow locations, duration) through:
Data collection via the at-sea observer and electronic monitoring programs.
Logbook information (for hake, provides location of catch and provides a cross-reference against information obtained through at-sea and electronic monitoring data).
Data collected through the shoreside monitoring program.
Anecdotal information provided informally (regular communications with managers) and formally (through US GAP).
Participation in coastwide Pacific hake surveys through chartered fishing vessels.
In the US, the Pacific Whiting Conservation Cooperative (PWCC) partners with the NMFS-Northwest Fisheries Science Center (NWFSC) and Southwest Fisheries Science Center's Santa Cruz Laboratory to conduct annual pre-recruit surveys.
As indicated in 3.5.1, fishermen are not only involved with the provision of data, but industry members are full participants in the peer-reviewed stock assessment process.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Canadian Fishery

BC fishermen provide an extensive suite of information and data on catch, discard, and other relevant data (such as tow locations, duration) through:

Total catch reporting.

Data collection via the at-sea observer and electronic monitoring programs.

Logbook information (for hake, provides location of catch and provides a cross-reference against information obtained through at-sea and electronic monitoring data).

Data collected through the dockside monitoring program.

Anecdotal information provided informally (regular communications with managers) and formally (through the various advisory committees (weekly to biweekly through IHAC during the season, and often through GTAC before and after the season).

Participation in coastwide Pacific hake surveys through chartered fishing vessels.

As indicated in 3.5.1, fishermen are not only involved with the provision of data, but industry members are full participants in the peer-reviewed stock assessment process.

Scoring Rationale: A score of 95 is achieved for the US and Canadian industries. Industries pay for at-sea observation, fund the larval research, and levy ad valorum fees on landings to fund the juvenile hake surveys. Better maintenance of electronic monitoring equipment is warranted.

3.5.3 *(Relates to MSC Criterion 3.8)*	Relevant research is carried out by the fishing industry and other organizations and is taken into consideration by the management system.	• The management system is aware of research carried out by the industry and other organizations and appropriate elements of this are taken into consideration for management.	• Applicable research carried out by the fishing industry and by other organizations is used by the management system.	• Industry research is co-coordinated with existing research plans of the management system.
Weight		**28.4**	**Score**	**US=100 CAN=100**

Client:

US Fishery

Research is the primary focus of the PWCC. The industry sponsored PWCC conducts an annual pre-recruit survey and supports research on hydro-acoustic survey methods, product enhancement, and ecosystem studies[cii].

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Canadian Fishery
The groundfish trawl industry also funds and directs the Canadian Groundfish Research and Conservation Society (CGRCS), the organization that coordinates research and stock assessment activities – in conjunction with those performed by DFO – on behalf of industry.

CGRCS retains a respected fisheries stock assessment scientist (Paul Starr) who co-authors numerous assessment papers with DFO.

CGRCS also gathers information from member fishermen (observations from the grounds, catch trends, stock trends) and relays this information to DFO science and management, both formally (through GTAC) and informally (day-to-day discussions). CGRCS has a formal co-management role, serving as the contracting agent for the groundfish trawl dockside monitoring program (currently let to a single service provider, Archipelago Marine Research). CGRCS also provides funding to support DFO staffing levels and projects of mutual benefit (for example, reviews of the IVQ/GDA plan, and computer programs to support IVQ management).

Industry contributes approximately $600,000 to $700,000 annually to the CGRCS to conduct research and stock assessments, with annual priorities set by CGRCS Directors. These funds are collected via a per pound levy on the IVQ holdings of each vessel. This is a voluntary level with 100% participation by the fleet. The amount of funding for research and stock assessment can be varied in response to changing scientific requirements.

In addition, any funds from relinquished catch accrue to CGRCS to fund its activities. Note that funding from relinquishments is minimal, as the fleet is highly efficient at operating within the rules (i.e. time frames for reallocation of quota) governing the IVQ program.

The at-sea observer program also conducts biological sampling on every trip as well as important species composition information. The costs of the observer program are not included in the CGRCS research funding program.

The information provided by CGRCS to DFO science and management is an integral part of the groundfish trawl fishery management system.

Scoring Rationale: A score of 100 is achieved for the Canadian industry because of extensive coordination with management and the information provided is from all segments of its industry. The US also warrants a score of 100.

The Northwest Fisheries Science Center recognizes the benefits that collaborative research can bring to west coast groundfish and is moving ahead to expand these research activities. The Center benefits from the wealth of knowledge about fish biology and stocks from state and federal fisheries resource agencies, environmental organizations, universities, and particularly the fishing industry. Several programs have been initiated by the US industry:

- PWCC is a member of the Groundfish Conservation Trust (GFCT) an association of west coast industry groups interested in enhancing groundfish research. The GFCT is currently funding research directed toward alternative rockfish survey methods with efforts focused on canary rockfish.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

- To improve estimates of hake recruitment, the PWCC partners with NMFS Northwest and Southwest Fisheries Science Center's to conduct an annual Hake Pre-Recruit survey.
- To improve the ability to assess hake stock status, the PWCC funded research at the University of Washington on modeling acoustic backscatter from Pacific hake. This project is also investigating the relationship between target strength and fish length for both juvenile and adult hake. This research, when published, will provide new estimates of target strength and underlying sources of target strength variability.
- To help answer the question of how much of which species of fish hake eat, the PWCC initiated a stomach collection program to start to gather information about predator-prey relationships that occur in the fish caught by the fishery.
- In 2004, the PWCC initiated a program to investigate alternative survey methods for widow rockfish in cooperation with the NMFS-Northwest Fisheries Science Center (NWFSC) and Fishermen's Marketing Association. During the first year of the program, a database of major widow rockfish grounds was developed through joint fishermen/scientist workshops. The results of these workshops helped define principal survey areas and seasonal variations in widow rockfish distribution.
- As a result from PWCC research in product recovery of harvested fish, PWCC vessels have achieved an average yield of 40% increase in surimi operations. This means that over 10 million pounds more food was produced from the same number of made possible under the harvest cooperative agreement.

3.5.4 (*Relates to MSC Criterion 3.8*)	Research results are available to interested parties in a timely fashion.	• The majority of research results are available to interested parties.	• Research results are available to interested parties on a regular and timely basis.	• Research results are proactively made available to all interested stakeholders on a regular basis and in a timely manner.
Weight		15.2	**Score**	**US=100 CAN=100**

Client: A coastwide (US and Canada) Pacific hake stock assessment is conducted annually by a joint technical team of scientist from both countries[ciii]

US Fishery

The research and stock assessments results are readily available to the public prior to and during Council deliberations. Research and assessment materials are part of the public domain and are posted on the Pacific Fishery Management Council website[civ].

Canadian Fishery

Both research and stock assessment processes, PSARC (Pacific Scientific Advice and Review Committee) and Can/US STAR panel, are open processes, with public participation permitted and encouraged. All stock assessments are in the public domain. Thus, interested parties can both participate in the research process and receive publications in a timely fashion

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Scoring Rationale: A score of 100 is justified for both the US and Canada. News releases are proactive and frequently made available to newspapers and published on websites. Advisory groups are provided information in a timely manner.

3.6 TAVEL Criterion 6	The management system effectively monitors all relevant performance aspects of the fishery.		
Weight	**12.6**	**Score**	

3.6.1 *(Relates to MSC Criteria 3.7, 3.9, 3.10)*	The management system has procedures to measure and record and independently evaluates all aspects of the fishery to provide a basis for assessments of stocks and program performance.	• The management system has a program that monitors the basic indicators of the stock status. • The program is subject to internal evaluation on a periodic basis. • Monitoring results are compiled, analyzed, and disseminated to fishery managers.	• The management system has a comprehensive monitoring program including adequate observer coverage (at-sea personnel/video). • The monitoring program has been subjected to independent outside review to identify gaps. • 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.	• Full monitoring records are made available to relevant research and management bodies. • Observer coverage in the fisheries is sufficient such that the management system can demonstrate a consistent ability to monitor all relevant aspects of the fishery and employs an independently verified system for validation of reported results.
Weight		**100**	**Score**	**US=75 CAN=75**

Client:

US Fishery

See 2.1.2.1 and 2.1.2.2 above, and 3.7.2 below. The US has both at-sea and shoreside catch monitoring programs through the WCGOP and

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

SHOP. SHOP's state based program is in transition to a federally based system which will use NMFS trained third party catch monitors. In 2008, the shoreside monitoring program will still be operated under exempted fishing permits[cv]. ODFW administers the SHOP program and receives data from Washington and California. They provide in-season bi-weekly catch reports. In addition, NMFS reports catches from the at-sea sector daily. Sea State (a contracted third party catch monitoring company) tracks catch and bycatch daily. All shoreside participants have to attend an EFP training session and sign an agreement which outlines performance conditions of the EFP.

Canadian Fishery

The BC hake fishery features comprehensive monitoring, with information gained from monitoring measures providing accurate, timely, independent catch (and bycatch) information to serve as a basis for stock assessments and evaluation of program performance.
Monitoring in the hake fishery is described as follows:

- Minimum 10% at-sea observer monitoring for shore-delivery trips in the lower west coast Vancouver Island area, where bycatch concerns are minimal. If incidence of non-target species is observed to be high, then additional at-sea monitoring is prescribed.
- 100% monitoring coverage for fishing trips for shore delivery in locations other than the lower west coast of Vancouver Island. This is a combination of at-sea observers and electronic monitoring (EM). A minimum of 10% at-sea observer coverage is prescribed. EM is 100% coverage. Vessels fishing with only EM must retain all catch.
- 100% at-sea observer monitoring in the Joint Venture fishery. Observers are mandatory on all mothership vessels and periodically on catcher vessels.
- 100% at-sea observer monitoring for BC vessels that head and gut hake. Canada currently does not allow processing of fish into surimi or fillets. Freezing of headed and gutted fish is allowed.
- 100% dockside monitoring program – weights of hake and non-target species for each groundfish trawl trip landed ashore is verified.
- Hail-out/hail-in system means that DFO has advance notice of the commencement and termination of all fishing trips.

At-sea monitors, electronic monitoring, and dockside monitoring services are all provided by an independently verified agent (currently Archipelago Marine Research). The monitoring system in the BC hake fishery is comprehensive and independently conducted, providing DFO with a highly accurate accounting of catch and bycatch in the fishery. Information gained from monitoring programs is utilized both for research and stock assessment purposes, and for actively managing the fishery. IHAC meets bi-weekly to consider appropriate management actions, armed with comprehensive, real-time fishery data gained through monitoring programs.

Scoring Rationale:

US Fishery.

A score of 75 is appropriate for the US fishery, at this time. For the at-sea hake sectors (i.e., catcher-processors and motherships), there is 100% human observation on-board the catcher-processor vessels and the motherships. All monitoring is tracked in near real-time (all reports are generally available to managers within 48 hours and reported on the PacFIN and NorPac web sites. Sea State alerts the fleet in real time to

higher than normal levels of bycatch so areas of higher bycatch can be avoided. The Council process subjects the monitoring program to review: the Council's Enforcement Consultants group has identified monitoring program data gaps (PFMC, 2008. Supplemental EC Report, September 2008).

However, there has not been a requirement for 100% monitoring of catcher vessels delivering to motherships (including the Makah fishery). Video equipment breakdowns aboard catcher vessels delivering shoreside have been problematic, and there has been difficulty obtaining video information to state officials for enforcement purposes in a timely manner (M. Cenci, August 1, 2008 Washington Department of Fish and Wildlife. Pers. comm. with Mark Pedersen).

Canadian Fishery

A score of 75 is appropriate for the Canadian fishery, at this time. In Canada, the Conservation & Protection (C&P) Directorate enforces commercial hake regulations. At the end of each season, statistics are compiled on the numbers of checks conducted from various platforms (at-sea, vehicle and foot), the number of charges resulting from these checks, etc. Using this information, staff can evaluate whether enforcement priorities were met and whether various enforcement activities were effective. Overall compliance rates for each area and fishery are calculated in order to identify priority areas for enforcement in subsequent seasons. Post-season review meetings with C&P and resource management staff are held on an annual basis. From these sessions, staff identify key enforcement issues and recommend strategies for addressing these issues (URL: http://www.pac.dfo-mpo.gc.ca/ops/Cp/evaluation_e.htm). While this internal process has merit, the monitoring program has not been subjected to independent, outside review. This is needed, for example, to assess whether the 10% at-sea observer monitoring for shore-delivery trips in the lower west coast Vancouver Island area is adequate, and at what level of increase would be adequate If incidence of non-target species is observed to be high.

Condition (US Only): The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors). Provide a summary report within two years showing how 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.

[Suggestion – US – Implement Enforcement Consultant's 2007 report recommendations on electronic monitoring, captured in Amendment 10.]

Condition (Canada Only): The client must subject the hake fishery monitoring program to an independent, external review to identify any gaps within two years.

[Suggestion: - Canada – The objective of the review is to have an impartial, experienced group conduct a review of the fishery monitoring program to confirm that the catch, discards and landings are known so that the stock assessment and management is best informed. This

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

condition could be met by an outside expert department, group or individual with necessary credentials to adequately review the monitoring system. The team could suggest names if requested.]

Client Action Plan:

U.S.-The hake fishery and all groundfish are subject to periodic stock assessment reviews, which includes outside reviewers. The overall stock assessment process is subject to periodic review as well, which includes data collection and monitoring. The 2007 Enforcement Consultants report recommendations on electronic monitoring have been approved by the PFMC and are scheduled for implementation in 2009.

Client will work with the Enforcement Consultants to ensure that a summary report is completed outlining how the results of the monitoring program are compiled, analyzed and disseminated to fishery managers. Clients will provide this report to the certifier within two years.

Canada- DFO will conduct an impartial review of the fishery monitoring program to confirm that the catch, discards and landings are known, and the stock assessment and management is best informed on the fishery. A panel of experts with expertise in fisheries monitoring system will be convened to examine the precision and accuracy of the current monitoring system and to insure that the program provides adequate catch monitoring. A report summarizing the results of this review will be delivered to the certifier within two years.

3.7 TAVEL Criterion 7	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.		
Weight	**15.0**	**Score**	
Weighting Rationale	PIs 3.7.4, clear record of enforcement action, and 3.7.5, fishery fully compliant, were of equal weight and were more important than the remain three PIs, which were of equal weight.		

3.7.1 *(Relates to MSC Criterion 3.16)*	Fishery participants are aware of the management system and legal and administrative requirements.	• Fishery participants are aware of key management and legal requirements.	• Fishery participants are aware of management and legal requirements to conduct the fishery and are kept up to date with new developments.	• All fishery participants are aware of management legal requirements through a clearly documented and communicated mechanism such as a code of conduct.
Weight		**14.3**	**Score**	**US=90 CAN=95**

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client:

US Fishery

In the US, Pacific hake fishery participants are highly aware of the management system, legal, and administrative requirements. The Council process informs participants of upcoming regulations. Newsletters are sent out to participants and license holders in each state are informed annual regulation changes and updates. Emergency regulations are sent to vessel operators by US Coast Guard Notices to Mariners. Pre-season meetings are held with at-sea and shoreside (SHOP) participants meetings to go over the EFPs and harvest strategies. The at-sea catcher-processor and mothership captains meet prior to the season to review rules and regulations and bycatch avoidance plans. Often NMFS NWRO personnel are present to inform the captains of regulations and reporting requirements.

Canadian Fishery

The BC hake industry is highly involved with the management system – through GTAC/GSIC, IHAC, and through co-management initiatives of CGRCS. Because the IVQ/GDA plan is complex, participants are, by necessity, keenly aware of how the system works, and the legal and administrative requirements. DFO notifies industry by issuing a Notice to Industry accessible to the public and on the DFO website.

In addition to fishery guidelines contained in the IFMP, each groundfish trawl license contains detailed conditions of license which sets out the rules governing all aspects of the hake fishery and groundfish trawl fishing activities.

The effectiveness of the IVQ/GDA system is demonstrated by the fact that there is virtually no involvement of the legal system in matters of compliance – most IVQ related accountability issues are addressed through transfers of quota from vessels holding a surplus of quota onto vessels in a deficit; these are arrangements made voluntarily amongst vessel/quota owners. The administrative consequences of failure to provide sufficient IVQ to cover landings (no more fishing, relinquishment of catch, and/or deductions from next years' quota) are sufficient to elicit full compliance.

Scoring Rationale: A score of 95 is justified Canada based on information provided. For the US, a score of 90 is justified. There is a "code of conduct" for most (but not all) of the industry as characterized by the PWCC Philosophy (URL: http://www.pacificwhiting.org/):
"The ability to communicate information amongst PWCC vessels and between other segments of the industry helps to facilitate bycatch reduction in the hake fishery as a whole. For example, the PWCC has prepared charts detailing known bycatch hotspots from information provided by interviews with Washington and Oregon coastal fishermen. The hotspots identify areas with high concentrations of yellowtail and widow rockfish. Copies of these charts were provided to all vessels in the hake fishery, along with the latitude and longitude of the areas. PWCC fishermen are required to avoid these areas and not fish there unless they are confident that only hake is present in the area.

Since the PWCC was founded bycatch avoidance and minimization has been a paramount goal of the organization. Research is ongoing to develop methods and fishing gears to reduce bycatch in the hake fishery. In 2003 and 2004, five vessels were equipped with recording

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

conductivity, temperature and depth (CTD) meters to examine if relationships between bycatch rates and oceanographic conditions could be found that would provide a signal to skippers that they were in areas of potentially significant bycatch. In prior years, PWCC contracted with Scientific Fisheries to test the utility of broadband sonar to identify bycatch species in the trawl path.

The PWCC is proud to be a leader in developing and using responsible fishing techniques to ensure sustainable fisheries. We will continue to do what is required to maintain the hake fishery as one of the cleanest fisheries in the world."

3.7.2 *(Relates to MSC Criterion 11)*	Surveillance and enforcement are in place to ensure that the fishery complies with requirements of the management system.	• Surveillance activities and enforcement measures are reactive and focused on key management measures. • Fishery compliance with management measures has been monitored sporadically but has not been fully demonstrated.	• Enforcement systems have been implemented and there is control and high compliance with most management measures that affect fishing mortality over the key fishing areas.	• There is a high degree of control on and compliance with all regulations that affect fishing mortality and stock health, for target and non-target populations, over all fishing areas.
Weight		**14.3**	**Score**	**US=75 CAN=95**

Client:

US Fishery

In the US, shoreside and at-sea monitoring programs are carried out by state agencies, NMFS, and the US Coast Guard. State and federal fisheries enforcement officers make use of USCG vessels to assist in surveillance and enforcement. In addition, all trawl vessels are equipped with electronic surveillance transponders as a part of the mandatory vessel monitoring system (VMS). Finally, fisheries are monitored through the West Coast Observer Program and Shoreside Hake Observer Program (see 2.1.2.1, 2.1.2.2, and 2.1.4.1 above. As indicated in prior responses, the groundfish trawl fishery management system contains a comprehensive level of surveillance and monitoring, coupled with an administrative system that motivates full compliance. Shore based catcher boats are all equipped with cameras. New rules are being promulgated for at-sea catcher boats to increase electronic monitoring through the use of cameras.

Canadian Fishery

As indicated in prior responses, the groundfish trawl fishery management system contains a comprehensive level of surveillance and monitoring, coupled with an administrative system that motivates full compliance.
Surveillance (monitoring) measures in Canada include:

At-sea observer monitoring (10-100%) coupled with electronic monitoring with full retention (100% in areas other than the lower WCVI).
100% Dockside (offload) monitoring.
Hail-out, hail in rules ensuring that DFO knows who is fishing at any given time.

Individual vessel monitoring is entirely conducted by an independent 3rd party. This independent party monitors species, catch amounts including landed catch and estimated discard, area fished, and date caught. This monitoring is supplemented by coastwide fleet-wide surveillance such as over-flights by fishery enforcement officers, patrol vessels, and a corps of dedicated fishery enforcement officers. Enforcement priorities are included in the IFMP.

The high level of monitoring and enforcement presence, coupled with the economic incentives and administrative consequences and remedies inherent in the IVQ plan result in compliance with key regulations and adherence to TACs.

Scoring Rationale: As score of 75 is appropriate for the US fishery. Certainly enforcement systems have been implemented, although the most activity occurred in 2007, with very little before that. In June 2007, there was a two-day joint marine fisheries enforcement training in Newport Oregon with the 3 states, NOAA and the USCG. There was at least one saturation emphasis in 2007 of the shoreside sector and a state citation issued to a processor for grinding up (wastage) and not reporting rockfish bycatch, one Oregon hake fisher was cited for unlawful possession of a salmon, and the investigation and prosecution of the *F/V Raven* discard case. Most enforcement has been reactive. There just are not enough human resources to have effective and efficient pro-active enforcement. One very significant issue is timeliness of the field officers' (mainly state) ability to obtain the on-board camera hard drive data. Currently it is reviewed by Archipelago, then goes to federal management staff, then to federal enforcement. Sometimes a year goes by before the data is available to make a state case (D. Mathews, NMNF, pers. comm.).

There seems to be consensus, however, that high compliance may or may not be attained (most likely, not). It all depends on how "high" is defined. Most hake enforcement jurisdictions agree that 40% of the fishers always try to be compliant, 40% may take advantage of a situation if risk to the resource and getting caught is low, and 20% will break the rules if reward is high, and the risk of getting caught is low. Most compliance is seen with the at-sea processor co-op, and motherships, while lower compliance is suspected with the catcher vessels that deliver to both motherships and shore-side. Some shore-side operations are chronically suspect, although one processor has hired an additional oversight staff to try to regain credibility. Washington shoreside enforcement needs at least 3 new officers dedicated for marine commercial fisheries enforcement and Oregon needs double that to assure control and compliance.

For the Canadian fishery, there is information to support a score a 95. There is no doubt enforcement systems have been implemented (In 2007, 801 hours of Officer time was expended on the groundfish trawl fishery. A further 14,260 hours of dedicated air surveillance time was utilized in 2007. There is one file on the commercial hake fishery where a vessel was detected fishing prior to hailing out. A warning was issued in this case, and there is comprehensive monitoring (but Certified Observers are not enforcement personnel) and severe management sanctions for non-compliance. The result is that during the past 11 years the Canadian IVQ system can be judged effective because no TACs have been exceeded over these years. While it can be inferred from this fact that there is control and high compliance, there is little actual enforcement data readily available to support this notion (because it is collected regionally). On the DFO website dealing with C&P, enforcement issues and strategies listed do not include any commercial groundfish (or hake) elements (only habitat, First Nations, Recreational

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

and Commercial Salmon). The IFMP list priorities, but presents nothing on past results. It would be desirable for Canada to provide quantitative evidence in regard to hake enforcement activities, such that the level of control and degree of compliance can be quantified.

Condition: (US Only) The fisheries client actively supports the implementation of Amendment 10 to the Council's Groundfish FMP (which requires electronic monitoring of all catcher vessels targeting hake and delivering to shoreside processors, and 100% observation of all whiting landings by compliance monitors at shoreside processors). Provide a summary report within two years which demonstrates a high degree of effectiveness.

Client Action Plan: The Enforcement Consultants recommendations have been adopted by the PFMC under Amendment 10.

Client will work with the Enforcement Consultants to ensure that a summary report documenting evidence of a high degree of effectiveness will be completed and provided to certifier within two years.

3.7.3 (*Relates to MSC Criterion 11)*	Corrective actions can be applied in the event of non-compliance and there is evidence of their effectiveness.	• When non-compliance is documented, mechanisms exist or are being developed to address non-compliance. • Corrective actions used have been demonstrated as effective in other fisheries.	• There are explicit measures used to address non-compliance in a formal or codified system. • The most commonly applied measures have been tested and found effective.	• Corrective actions are applied in the event of non-compliance, and all of these have been demonstrated to be effective.
Weight		**14.3**	**Score**	**US=70 CAN=90**

Client:

US Fishery

Although detailed enforcement action records are not available from the National Marine Fisheries Service, NMFS states that the vast majority of commercial and recreational fishermen abide by the law. The NOAA fisheries enforcement program is administered by the Office for Law Enforcement[cvi].

Canadian Fishery

The Canadian IVQ quota management system handles non-compliance primarily through administrative means:
Identifies non-compliance (through comprehensive monitoring) – for example, exceeding individual quotas.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Allows individuals to remedy non-compliant situations – transferring quota on to their vessel after delivery (but before another fishing trip is permitted).

Where catch overages cannot be remedied through retro-active quota transfer:

1. Equivalent poundage to the overage to established levels is subtracted from the following year's available quota by species and species area group.
2. Further fishing for the balance of the season in the area in question is prohibited.
3. Proceeds from catch in excess of allowed overages must be relinquished.
4. In the past 11 years of our IVQ system this has proven effective as no TACs have been exceeded over the years[cvii].

Scoring Rationale: A score of 70 is justified for the U.S. fishery. Citations are issued for non-compliance of codified laws and regulations, and fines can result at disposition. No evidence has been provided to test the most commonly applied measures for effectiveness.

A score of 90 is justified for the Canadian fishery, based on information presented. A higher score would be possible if specific information for the hake fishery could be separated from the general enforcement actions that characterized and quantifies non-compliance (e.g. the number exceeding individual quotas) and associated corrective actions.

Condition (US Only): The US must develop and implement a system to evaluate the effectiveness of corrective measures, within three years.

[Suggestion: At the end of each season (if not more frequently), statistics are compiled on the numbers of compliance contacts conducted from various platforms (at-sea, shoreside and aerial), and the number of charges resulting from these contacts, etc. Using this information, staff can evaluate whether enforcement priorities were met and whether various enforcement activities were effective. Overall compliance rates for each area and harvest segment are calculated in order to identify priority areas for enforcement in subsequent seasons.]

Client Action Plan: The clients will work with NMFS and state enforcement agencies to develop an annual reporting system within three years for the hake fishery such that at the end of each season, statistics will be compiled on the number of compliance contacts conducted from various platforms (at-sea, shoreside and aerial), and the number of charges resulting from these contacts. Using this information, agency staff will evaluate whether enforcement priorities were met and whether various enforcement activities were effective. Overall compliance rates for each area and harvest segment will be calculated in order to identify priority areas for enforcement in subsequent seasons.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.7.4 *(Relates to MSC Criterion 3.16)*	There is a clear record of enforcement actions (by-catch limits, mesh regulations and closed areas and seasons).	• Informal evidence of violations and corrective action exist.	• Formal evidence of violations and corrective actions is available and readily retrievable. • Information is sufficiently detailed to characterize violations.	• Enforcement activities are fully documented through at-sea, dockside as well as investigative actions. • The outcomes of enforcement actions are considered in adjusting enforcement efforts.
Weight		**28.6**	**Score**	**US=85 CAN=70**

Client:

US Fishery

Although enforcement action records are maintained, they are not available to the public from the National Marine Fisheries Service. NMFS states that the vast majority of commercial and recreational fishermen abide by the law[cviii].

Canadian Fishery

As indicated in prior responses, the high level of monitoring in the fishery and the Canadian IVQ system precludes any significant number of incidents requiring any enforcement actions over-and-above those prescribed through the administrative system. The administrative system provides a clear and comprehensive record of actions.

For any enforcement actions outside the administrative system, for example accidental retention of prohibited species, there is a clear record of actions and sanctions.

Scoring Rationale: A score of 85 is justified for the US fishery. While the client's initial effort to obtain information on enforcement actions was not successful, evidence of violations and corrective actions is available, although the most activity occurred in 2007. There was one case in 2002, a processor found guilty of over-reporting hake and rockfish weigh-backs resulting in fines/restitution over $800,000 (Oregon Department of Justice, August 7, 2002 Media Release). In June 2007, there was a two-day joint marine fisheries enforcement training in Newport Oregon with the 3 states, NOAA and the USCG. There was at least one saturation emphasis in 2007 of the shoreside sector and a state citation issued to a processor in for grinding up (wastage) and not reporting rockfish bycatch (M. Censi, WDFW. August 1, 2008. pers. comm. with Mark Pedersen), one Oregon hake fisher was cited for unlawful possession of a salmon (Oregon State Police Fish & Wildlife Newsletter July 2007), and the investigation and prosecution of the *F/V Raven* widow rockfish discard case. For all state programs, improvement is needed to sufficiently characterize violations relative to the hake fishery.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

A score of 70 is appropriate for Canada because records are kept locally within the region and information is not sufficiently detailed to characterize hake violations.

Condition: (Canada Only): Canada must develop a system, within two years, to provide documentary evidence that there is a clear record of actions and sanctions, and that sufficiently characterizes violations relative to the hake fishery. Once that is addressed, credit can be given for elements under SG 100 that are being addressed.

[**Suggestion**: Provide a comprehensive query of the DVS system and provide detailed characterization of the hake fishery violations and disposition of violations (charged, ticketed, court, etc...). For example: The license numbers of all whiting vessels and processors could be run to see if there are any violations have occurred and if so, what were the dispositions of those cases. The team does not need specific information on harvesters (i.e. report does not need to provide identity of the vessels or harvesters).

Client Action Plan: Within two years DFO will provide a comprehensive query of the DVS system and provide documentary evidence of detailed characterization of the hake fishery violations and disposition of violations (charged, ticketed, court, etc.). Commitment from DFO verified by TAVEL Certification.

3.7.5 *(Relates to MSC Criteria 3.11, 3.16)*	The fishery is fully compliant with fishing regulations and directives to fishing practices.	• A basic analysis of compliance has been conducted. • The majority of harvesting is compliant.	• Based on analysis of results from surveillance and monitoring activities, it is concluded that there is overall compliance with fishery regulations that impact fishing mortality, with few exceptions.	• The fishery operates with no significant patterns of non-compliance. • Based on analysis of results from surveillance and monitoring, it is concluded that there is overall compliance with all fishery regulations
Weight		**28.6**	**Score**	**US=75 CAN=95**

Client:

US Fishery

As indicated in prior responses, the U.S. fisheries operate with no significant patterns of non-compliance (See 3.2.1 and 3.7.4 above).

Canadian Fishery

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Canadian fisheries operate with no significant patterns of non-compliance (See 3.2.1 and 3.7.4 above). The monitoring/surveillance system both ensures and confirms this.

Scoring Rationale: The US fishery activity meets the 60 SG. Given feedback from the observer coverage, the at-sea processors segment clearly achieves a score of 100. Based on interviews with the enforcement staff, it is estimated that about 20% of the other fishers are ambivalent regarding compliance. For example, relative to the requirement for catcher vessels to carry on-board cameras, there were a number of non-compliance issues in the 2007 season. These included a high percentage of camera outages, the duration of outages was up to 3 hours, and in some cases it was clear vessels were hauling back during outages.

Based on the level of the surveillance on-shore, there is an appearance of overall compliance, although there is not enough information to demonstrate "few" exceptions. This is based on the suspicions of the officers in the field, and inability to quantify the level of compliance. Thus an overall score of 75 is appropriate for the US fishery.

A score of 95 is justified for the Canadian fishery, based on information presented in 3.7.3 above, and 3.7.4 as it related to monitoring.

Condition (US Only): A score of 80 or higher will be attainable upon effective implementation of the elements of the Council's Enforcement Committee 2007 recommendations. A report that documents levels of surveillance and monitoring and presents results of analysis of these activities, including an evaluation of the level of compliance, must be completed within three years.

Client Action Plan: The PFMC is in the process of implementing the Enforcement Consultants report of 2007.

The client will formally petition the PFMC to task the Enforcement Consultants with conducting an analysis of the levels of compliance, to be completed within 3 years.

3.8 TAVEL Criterion 8	The performance of the management system is regularly and candidly evaluated in a systematic fashion and the system responds positively to appropriate recommendations for change.		
Weight	**10.5**	**Score**	
Weighting Rationale	Two PIs were of equal importance.		

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100
3.8.1 *(Relates to MSC Criterion 3.3)*	The management system provides for program evaluation and review.	• The management system conducts informal, internal program reviews.	• The management system has explicit provision for an objective, systematic, external evaluation of management performance. • The criteria for and results of the evaluation of management performance are made public. • Regular reviews are carried out at time intervals that foster timely improvements in management system.	• 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.
Weight	**50.0**	**Score**	**US=90 CAN=90**

Client:

US Fishery

See 3.5.4 above. The joint US and Canadian fishery Pacific hake assessments provide for annual program evaluation and review. In the US, the Council process allows for periodic amendments to the FMP which are also subject to the NEPA process and involves extensive evaluation and review of amendment preferred options and alternatives. Currently, the Council is considering amending the FMP for groundfish (including Pacific hake) to consider a trawl individual quota program similar to Canada's.

Canadian Fishery

In Canada, the GTAC and IHAC provide ongoing (pre-season, in-season, and post-season) reviews of the conduct and operation of the fishery. These are conducted jointly by DFO, industry, and other stakeholders. The Canada/US Hake/Whiting Agreement also contains provisions for annual fishery review, considering the experiences of previous seasons (Article 4(d)).

GSIC (Groundfish Special Industry Committee) has conducted periodic formal reviews of the effectiveness of the IVQ/GDA plan from conservation, economic, and social perspectives. Each Review has found the IVQ/GDA plan to be highly beneficial overall, but has recommended incremental changes to the plan. All of the recommended changes have been adopted by DFO.

In addition to formal program reviews, GSIC also meets several times a year to consider issues related to the IVQ/GDA plan as they arise.
The above noted processes reflect input from all stakeholder groups and are either open to the public, or findings/reports/minutes are available to the public.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Scoring Rationale: A score of 90 is appropriate for the US program. The Council's Groundfish plan amendment system, which is subject to NEPA review demonstrates satisfaction of the elements in SG 80. The openness of this process and timely notification of results warrants the higher score. A higher score is possible if communication of enforcement actions/dispositions becomes more timely and specific to the hake fishery.

A score of 90 is also appropriate for the Canadian system. Because the management is solely at the discretion of DFO, outside evaluation of the system is effectively done by the GTAC, IHAC and the GSIC (Groundfish Special Industry Committee), as well as other groups that advise DFO. A higher score is possible if communication of enforcement actions/dispositions becomes timely and specific to the hake fishery.

3.8.2 *(Relates to MSC Criteria 3.3, 3.7)*	The management system requires a response to outcomes of internal or external reviews.	• The management system is responsive to required reviews of management performance, but there is no prescribed mechanism for the responses.	• The management system has established explicit objective guidelines for responding to internal and external reviews of management performance. • The management system shows evidence of improved performance based on the results of internal and external reviews of management performance.	• The management system has established comprehensive, objective standards or triggers for responding to internal and external reviews of management performance. • The management system has demonstrated a consistent pattern of responding to the results of internal and external reviews of management performance.
Weight		50.0	**Score**	**US=95 CAN=75**

Client:

US Fishery

See 3.8.1 above. Responses to internal and external reviews are an integral part of the management system. Quotas and fisheries management actions require evaluation of reviews undertaken by advisory bodies and governmental agencies. The Council process is highly responsive to reviews by various advisory bodies (GMT, GAP, and SSC) described above.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Canadian Fishery

See 3.8.1 above. In practice, the management system is highly responsive to review findings and recommendations of bodies such as those described in prior responses: GTAC, GSIC, and IHAC. The Canadian GSIC and IHAC, in particular, are multi-stakeholder consensus processes. Where stakeholders concur on a course of action, which is consistent with resource conservation, then the management system has a track record of responding favorably to recommendations and advice.

Scoring Rationale: A score of 90 is appropriate for the US system. The Council and NMFS have responded to the challenge of minimizing bycatch in West Coast hake fisheries by tightening monitoring requirements (see section 3.6.1); specifying strict sector-specific total catch limits for those overfished species that are incidentally caught in hake fisheries, and by allowing NMFS to automatically restrict the depths that non-tribal hake vessels fish, if needed to reduce bycatch. These measures have reduced bycatch in hake fisheries and have been responsive to the management challenges imposed by recent hake fisheries.

Both the Council system and NEPA review process have explicit provisions of law (the triggers) for responding (with timelines) to internal and external reviews. The history of response to the Council's fishery management plan amendment process demonstrates the pattern of responding to the reviews of the performance. For example, in response to internal and external stakeholder inputs, the Council is pursuing a trawl rationalization program that contemplates cooperative management for the at-sea hake sectors, and individual transferable quotas for the shoreside hake and non-hake trawl sectors. Implementation of trawl rationalization measures is anticipated in 2011. The Council is scheduled to make their final decisions on this initiative in November 2008.

The score for the Canadian system is 75. While the management system shows evidence of improved performance based on the results of internal and external reviews of management performance, there has been no specific evidence presented that the management system has established explicit objective guidelines for responding to internal and external reviews of management performance. The Terms of Reference of the GTAC has explicit guidelines for providing reviews, but there is nothing stated regarding the nature of the response to that review. The second bullet for SG100 appears to have been met.

Condition (Canada Only): The DFO recently posted a web publication of a new Framework for the management of fisheries resources (http://www.dfo-mpo.gc.ca/sds-sdd/2007-2009/index-eng.htm). The Framework pulls together, in a cohesive package, existing fisheries management policies, and program tools along with new ones, to help establish a more consistent, transparent and results-focused approach to managing fisheries. This will be accomplished with tools for DFO to monitor, self-assess its plans and program delivery, and report on results.

SG80 must be met within two years. Canada must provide a summary report of the results of implementation of the Framework as pertains to hake, and its policies and initiatives (stakeholder consultation, data gap analysis, and priority setting), as it relates to explicit objective guidelines for responding to internal and external reviews of management performance in its management system.

PERFORMANCE INDICATOR	SCORING GUIDEPOST 60	SCORING GUIDEPOST 80	SCORING GUIDEPOST 100

Client Action Plan: Within two years DFO will provide a summary report of the results of implementation of the Framework as pertains to hake, and its policies and initiatives (stakeholder consultation, data gap analysis, and priority setting), as it relates to explicit objective guidelines for responding to internal and external reviews of management performance in its management system. Commitment from DFO verified by TAVEL Certification.

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