



**Surveillance Report  
Gulf of Alaska Pollock Fishery  
Certificate No.: MML-FC-007  
Moody Marine Ltd.  
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## 1.0 GENERAL INFORMATION

**Scope against which the surveillance is undertaken:** MSC Principles and Criteria for Sustainable Fishing as applied to the Bering Sea and Aleutian Islands Pollock Fishery

**Species:** Pollock (*Theragra chalcogramma*)

**Area:** Gulf of Alaska (GoA)

**Method of capture:** Pelagic trawl fishery

<b>Date of Surveillance Visit:</b>	<b>4-8 May 2009</b>			
<b>Initial Certification</b>	<b>Date: 14 February 2005</b>		<b>Certificate Ref: MM-FC-007</b>	
<b>Surveillance stage</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3rd</b>	<b>4th</b>
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## **2.0 RESULTS, CONCLUSIONS AND RECOMMENDATIONS**

This report contains the findings of the fourth surveillance cycle in relation to this fishery. As with the previous three surveillance reports, much of the discussion below relates to compliance with the Conditions of Certification set out in the certification report. Furthermore, at the beginning of the site visit we received representation from a number of stakeholders that highlighted issues and concerns with different aspects of the GoA and BSAI fisheries and their management (see appendix 1 for written submissions). These were specifically examined in the course of our audit and, where they are applicable to outstanding or closed conditions, are incorporated in the table below.

Information has been collected principally from reports provided by the client, staff at the Alaska Fisheries Science Center (AFSC) (National Marine Fisheries Service – NOAA Fisheries) and from written stakeholder submissions. Meetings and telephone conferences have been undertaken with At-Sea Processors Association (APA), NOAA Fisheries, Greenpeace, WWF and the West Coast Trollers Association (Area G).

For each condition that remained open following the third surveillance report in 2008, this report sets out the original assessment scoring guideposts, the scoring commentary and the requirements of the original Condition ('Activity assessed'). These identify the areas in which the fishery was determined to perform below the level required by the MSC standard during the initial assessment, and the actions that were taken to address these issues.

As required by the MSC assessment methodology, APA produced an Action Plan setting out the stages involved in addressing the Conditions raised ('APA Action'). This Action Plan was deemed to be adequate by the original main assessment team. According to the terms of the Action Plan, the client has provided information on the work undertaken to date (the 'APA Progress Report'). This progress report has now been evaluated by the Moody Marine assessment team ('Observations' and 'Conclusion') against a) the commitments made in the Action Plan, b) the intent of the original Condition and c) the original scoring indicator, guideposts and commentary. The influence of any overall legislative and management changes in the fishery are also taken into consideration.

During the 2009 surveillance, all the conditions that had remained open following the 2008 surveillance were closed, as all were assessed to have reached or exceeded the 80 scoring guideposts. This report details the work that was undertaken, and information that was made available, during the 2008-2009 period that allowed this to occur.

An important issue that was considered in great detail by the assessment team was the 20% increase in the bycatch of Chinook salmon over the past three years that was identified by stakeholders, managers, scientists and the client. Given the depleted state of many Chinook stocks, reduction of bycatch should be a priority in all fisheries. A variety of measures will be considered by the NPFMC in the fall of 2009. If the GOA pollock fishery is re-certified, bycatch data from 2008 and 2009 fisheries, and decisions by the NPFMC fall meeting, will have to be scrutinized carefully as part of the 2010 audit. Salmon bycatch levels and effectiveness of measures intended to minimize it, will also need to be monitored carefully.

Item	Comments
<b>0</b>	<b>Update on Stock Status</b>
<b>Activity Assessed</b>	<p>The original data-gathering phase of the MSC assessment of the Gulf of Alaska (GoA) Pollock Fishery took place in 2002. As the progress of an MSC assessment is usually entirely based on the data available at the time of this data gathering, changes in stock status are likely to have occurred since which will not have been reported in MSC-related documentation.</p> <p>Moody Marine has therefore asked APA to prepare an update on GoA pollock stock status over the period between the original assessment and this, the fourth annual surveillance report. The intent of this section is to bring background information up to date and so to allow subsequent condition information to be evaluated in light of this.</p>
<b>APA Progress Report</b>	<p>Alaska Fisheries Science Center (AFSC) scientists updated assessments for eastern Bering Sea (EBS), Aleutian Islands (AI), and Gulf of Alaska (GOA) pollock during November, 2008. The assessments are available at: <a href="http://www.afsc.noaa.gov/REFM/Stocks/assessments.htm">www.afsc.noaa.gov/REFM/Stocks/assessments.htm</a>.</p> <p>The assessments were reviewed by the Bering Sea and Aleutian Islands (BSAI) and GOA groundfish “plan teams.” The teams are convened by the North Pacific Fishery Management Council (NPFMC). In December the assessments and plan-team reviews were considered by the NPFMC Science and Statistical Committee (SSC). Using this information, the SSC provided recommendations for overfishing (OFL) and acceptable biological catch (ABC) amounts for the 2009 fishing year. The discussion below summarizes the issues considered and the results obtained for Alaska pollock during this annual “harvest specifications” process. A description of the process and a summary of the results for 2009 are provided by the NPFMC (2008a,b). See also the summary at: <a href="http://www.afsc.noaa.gov/Quarterly/ond2008/divrptsREFM6.htm">www.afsc.noaa.gov/Quarterly/ond2008/divrptsREFM6.htm</a>.</p> <p><b>Assessment Structure and Input Data</b></p> <p>There were no changes to the age-structured assessment model for 2008. All of the “standard” assessment input data updates were included in the revised model except for the NMFS bottom trawl survey, which is a biennial survey and was not conducted during 2008. These new data included:</p> <ol style="list-style-type: none"> <li>1) biomass and length compositions from the annual summer bottom-trawl survey of GOA near-shore areas conducted by the ADF&amp;G;</li> <li>2) 2008 biomass and 2007 and 2008 age compositions from the NMFS acoustic, water-column (EIT) survey of the Shelikof Strait spawning grounds;</li> <li>3) age compositions from the 2007 NMFS bottom-trawl survey; and</li> <li>4) total catches and age compositions from the 2007 fishery.</li> </ol> <p>As in recent years, the EIT survey was carried out during the spawning period (late winter-early spring), and was expanded to investigate known spawning aggregations north of the Shumagin Islands, in Sanak Island gully, and along the Chirikof-area shelf break. Results from all of these surveys are used to provide estimates of pollock biomass and its distribution over the GOA shelf as well as the expected length and age composition of the biomass during the fishery (Guttormsen 2007).</p> <p>The reference model for GOA pollock does not estimate the NMFS bottom-trawl survey catchability endogenously, but rather fixes this parameter at one (1.0). A likelihood profile for the survey catchability developed from alternative model runs with catchability estimated endogenously shows that a survey catchability of 0.74 yields the highest likelihood value (Dorn <i>et al.</i> 2008). Model estimation with survey catchability less than one results in higher estimated stock sizes and thus higher <math>F_{40\%}</math> ABC tonnages (Figure 1.19 in Dorn <i>et al.</i> 2007). As such, the choice to fix the bottom-trawl survey catchability at 1.0 in the GOA assessment is conservative. If catchability is actually lower than 1.0 – which is consistent with the likelihood profile analyses and studies of catchability of many fish species with body shapes and behaviours similar to pollock in bottom trawl surveys, then true stock biomass and yield are higher than is estimated with catchability fixed at 1.0.</p>

### Survey Results

The Shelikof Strait echo-integration trawl survey showed a biomass estimate of 208,000 tons, an increase of 15 percent over 2007. However, the biomass of pollock larger than 42 cm (a proxy for spawning biomass) was 52 percent lower than for 2007, apparently due to low recruitment to the spawning population (Figure 1.5 in Dorn *et al.* 2008). In 2007, the results were similar, with spawning biomass in Shelikof Strait lower by 47 percent compared to 2006 due to the ageing of the relatively strong 1999 and 2000 year classes and very little recruitment from the 2001-2003 year classes. The upshot is that while survey biomass in Shelikof Strait has been somewhat stable over the past several years, spawning biomass apparently continues to decline.

In contrast, the 2008 biomass estimate from the ADF&G bottom-trawl survey was 83,500 tons, up about nine percent from the 2007 estimate. In addition, while the ADF&G survey typically picks up very large pollock (age eight and older), the 2008 size composition shows a mode at 44 cm, which is consistent with the recruitment of a strong year class (or classes) to the mature component of the population sampled by this survey (Figure 1.8 in Dorn *et al.* 2008). As with 2008, the Shelikof Strait survey and the ADFG groundfish trawl survey for 2009 show differing trends, with the ADFG survey showing an increase while the EIT survey shows a decline.

The short-term concern with GOA pollock is the low survey estimates of spawning biomass for Shelikof Strait and other spawning areas in 2007 and 2008. In previous years, concerns about spawning activity in Shelikof Strait were lessened by additional winter survey efforts which, in aggregate, showed estimates of spawning biomass that approximated the model estimate. In 2008, while estimates of biomass in Shelikof Strait and the Shumagin area remained close to their 2007 minimums, the other surveyed areas showed declines. As such, for 2008 the survey estimates of spawning biomass for all GOA areas together were only 34 percent of the model estimate.

Looking at survey indicators of recruitment, the 2008 estimates of age-one pollock in both the Shumagin area and Shelikof Strait were relatively large, suggesting that the 2007 year class is both abundant and widespread. The age-one estimate from Shelikof Strait is the fifth largest out of 25 surveys, which also suggests that recruitment from the 2007 year class is likely to be above average, although its FOCI prediction is just average. Analysis of recruitment and spawner productivity shows that since 1980 strong year classes have recruited every four to six years, and that strong and weak year classes have been produced at high and low levels of spawning biomass. For example, the 1972 year class, one of the strongest on record, was produced by a spawning biomass estimate close to the current level (Dorn *et al.* 2008).

### Survey Vessel Comparison Experiment

A survey-vessel comparison experiment was conducted in March 2007 during the Shelikof Strait acoustic trawl survey. The experiment involved the *R/V Miller Freeman* (used to conduct Shelikof Strait surveys since the mid-1980s), and the *R/V Oscar Dyson*, a noise-reduced vessel designed to conduct surveys traditionally done by the *R/V Miller Freeman*. Data were collected both with the two vessels running side by side at a distance of 0.7 nautical mile, or with one following nearly directly behind the other at a distance of about one nautical mile. The methods were similar to those used during the 2006 Bering Sea comparison experiment (De Robertis *et al.* 2008). Results indicate that the ratio of 38 kHz pollock backscatter from the *R/V Oscar Dyson* relative to the *R/V Miller Freeman* was significantly greater than one (1.13), as would be expected if a quieter vessel reduced the avoidance response of the fish. Because this difference was significant, both survey estimates were included in the GOA pollock stock assessment.

### Stock Status

Table 1 summarizes the evolution of the status of the GOA pollock stock since 2002. GOA pollock is managed using the TIER 3 harvest control rules. The over-fishing mortality rate is set as the  $F_{35\%}$  fishing rate, and this rate combined with an estimate of age 3+ biomass provides an OFL tonnage. The maximum target-fishing rate is determined as the  $F_{40\%}$  fishing rate and, when combined with an estimate of age 3+ biomass, provides the maxABC. The reproductive biomass associated with  $F_{40\%}$  fishing is the stock-status benchmark for GOA pollock: should

stock reproductive biomass drop below this benchmark, then target fishing mortality rates are reduced via the “automatic rebuilding” algorithm that forms part of the harvest control rule. The  $B_{35\%}$  biomass, a commonly used proxy for the  $B_{MSY}$  benchmark when knowledge of stock-recruitment relationships is uncertain, is included in Table 1 for comparison.

Table 1. Gulf of Alaska Pollock Stock Status, 2002-2008.

	2002	2003	2004	2005	2006	2007	2008
- - - - - Thousands of Metric Tons - - - - -							
Exploitation Benchmarks <sup>a</sup>							
ABC	51.8	47.9	64.7	85.2	80.4	62.2	53.6
OFL	75.5	69.4	91.1	144.3	110.1	87.2	72.1
$B_{35\%}$ <sup>b</sup>	420	434	400	392	384	388	416
$B_{40\%}$ <sup>b</sup>	480	496	458	448	440	442	474
Stock Status							
Begin-Year Biomass (Age 3+)	1,130	993	841	709	543	558	537
Spawning Biomass (males and females)	284	280	336	416	424	326	322
Total Allowable Catch	51.8	47.9	64.7	85.2	80.4	62.2	53.6
Total Catch	50.7	49.5	62.8	80.1	70.5	51.8	52.1

Source: Chapter 1, GOA SAFE Reports 2002-2008.

<sup>a</sup> Includes the western, central, and west Yakutat portions of the GOA.

<sup>b</sup> Equilibrium estimate under average recruitment.

Since 2002 the reproductive potential of the GOA pollock stock has remained relatively stable while the begin-year age 3+ biomass has slowly declined. During this time the age 3+ biomass has been supported mainly by recruitment from the 1999 and 2000 year classes (Figure 1.21 in Dorn *et al.* 2008). With the ageing of these year classes, stock spawning biomass now approximates the  $B_{30\%}$  benchmark, and the assessment model results track the NMFS bottom-trawl survey fairly well (Figure 1.17 in Dorn *et al.* 2008). Because the stock is above one-half of its  $B_{35\%}$  stock size, it is not considered to be overfished. In addition, future projections of stock reproductive biomass indicate that the stock is not approaching an overfished condition.

To evaluate the probability that spawning biomass will drop below the  $B_{20\%}$  threshold, the stock was projected forward for five years with harvests calculated using the spawning biomass estimated for each year and the authors' modified constant-buffer harvest control rule (see below). The likelihood of future spawning biomass was then sampled using Markov chain Monte Carlo analysis. The results indicate that the probability of the stock dropping below  $B_{20\%}$  is highest in 2009 (12 percent) and drops to less than one percent in subsequent years. This projection incorporates uncertainty in stock status, uncertainty in the estimate of  $B_{20\%}$ , and variability in future recruitment (Dorn *et al.* 2008).

#### Harvest Specifications for 2009

As noted above, the TIER 3 harvest control rules provide a tonnage “buffer” between the max ABC and the proxy MSY harvest (the OFL tonnage), as required by the 1996 US Sustainable

Fisheries Act. The purpose of the buffer is to provide a margin of safety so that assessment errors will not likely result in a harvest greater than the MSY harvest. In 2001, a relatively high GOA pollock TAC based on the maximum ABC allowed by the TIER 3 rules was established, although it was not entirely harvested. However, in 2002 new resource-survey information suggested that GOA pollock abundance was lower than projected in the 2001 assessment. In retrospect, had the entire TAC been harvested in 2001, the OFL would have been slightly exceeded (Dorn *et al.* 2001).

Subsequent analysis of the structure of the TIER 3 rules showed that the size of the MSY buffer decreased as stock reproductive biomass dropped below the  $B_{50\%}$  benchmark, and that below the  $B_{40\%}$  benchmark, true spawning biomass cannot be more than about eight percent lower than estimated biomass to avoid overfishing (Dorn *et al.* 2001). Because there will always be some probability of exceeding the  $F_{40\%}$  rate due to imprecise stock assessments, and because the GOA pollock biomass has steadily declined since the mid-1980s for reasons that remain unknown, the authors of the GOA pollock assessment developed an alternate “constant-buffer” or “author’s F” harvest control rule that essentially increases the “spawning-biomass space” between the maximum ABC and OFL fishing rates (Figure 1.24 bottom panel in Dorn *et al.* 2008). Since 2002 the recommended ABCs in the GOA pollock assessments have used the “constant-buffer” harvest control rule as a further measure to ensure a precautionary GOA pollock harvest.

Although the NMFS bottom-trawl survey was not conducted in 2008, new information from the winter EIT surveys and the ADF&G groundfish survey was available. For 2009 the estimate of spawning biomass is about 266,000 tons, which is 22 percent of the unfished biomass. Because this estimate is less than the  $B_{40\%}$  benchmark, the GOA pollock stock is managed using the TIER 3b harvest control rules, and the  $\max F_{ABC}$  fishing rate must be reduced according to the automatic rebuilding schedule. With automatic rebuilding, the TIER 3 rules provide an OFL of 58,590 tons and a  $\max ABC$  of 50,770 tons for 2009.

Applying the “constant buffer” calculation to the TIER 3b rules yields a recommended “author’s ABC” of 43,270 tons, a decrease of 15 percent from the  $\max ABC$ , and a decrease of 19 percent from the 2008 ABC. Both the GOA Plan Team and the SSC agreed with the OFL and ABC recommended for 2009 in the 2008 assessment (NPFMC 2008a; SSC 2008). The NPFMC adopted the SSC recommendations, and set the 2009 pollock TAC at 41,620 tons for the combined GOA areas to the west of east Yakutat (the reduction from 43,270 tons is due to the allocation of 1,650 tons to the Alaska-waters pollock fishery in Prince William Sound).

#### **Ecosystem Considerations**

Significant anomalies in the climate forcing of the GOA occurred in the winters of 2006-2007 and during the spring of 2007. The former period featured anomalous south-westerly winds, which given the prevailing seasonal winds, meant enhanced wind mixing and enhanced positive wind stress curl and hence upward Ekman pumping. The net effect was a relatively shallow mixed layer in the central GOA, and deep mixed layer depths close to the coast, as compared with the previous year. During spring 2007, anomalously low sea level pressure was present in the central GOA, which promotes anomalous down welling in the coastal zone, and a relatively strong Alaska Coastal Current (Boldt 2007).

The North Pacific atmosphere-ocean system from fall 2007 through summer 2008 featured relatively cool sea surface temperature (SST) along its northern flank along a band extending from the Bering Sea through the Gulf of Alaska to off the coast of California. These negative SST anomalies were associated with a sea-level pressure (SLP) pattern that promoted enhanced westerly winds across most of the northern portion of the basin during fall through spring. The SLP anomaly pattern itself is consistent with remote forcing from a tropical Pacific La Niña episode which developed in late 2007. Subsequently near-neutral El Niño-Southern Oscillation conditions became established in the summer of 2008, and that these conditions have persisted into spring 2009 implies relatively low predictability for the North Pacific climate system in the upcoming 6-9 months (Boldt 2008).

Prior to 2004, the ecosystem considerations that routinely influenced the setting of the ABCs for GOA pollock were not stated explicitly in the stock assessment. In 2004 a standard format

	<p>for considering the linkages between the pollock fishery and the GOA ecosystem was adopted, and an ecosystem-level trophic map is now included in the assessment. The trophic map is developed from summer food habits data collected from NMFS bottom-trawl surveys during 1990-2005 and includes both adult and juvenile pollock biomass components. The largest consumers of adult GOA pollock are arrowtooth flounder, Pacific halibut and Pacific cod, Steller sea lions, and the pollock trawl fishery, with consumption by arrowtooth, halibut and cod making up about 72 percent of total adult pollock mortality. Other significant adult pollock consumers include sablefish, other adult pollock, and pinnipeds other than SSLs. These second-tier pollock consumers account for an estimated 11 percent of total adult mortality. For juvenile pollock, the largest consumers are arrowtooth flounder, adult pollock, and piscivorous birds, which together account for about 70 percent of estimated total juvenile mortality (Figures 1.30-1.31 in Dorn <i>et al.</i> 2008).</p> <p>As for the diet of GOA pollock, all ages are primarily zooplanktivorous during the summer growing season (more than 80 percent of the diet by weight for both adults and juveniles). By far the largest components are copepods and euphausiids, but for adults, in some years, gelatinous zooplankton and shrimp also make up a large fraction of the diet (Figures 1.28-1.29 in Dorn <i>et al.</i> 2008).</p> <p>For 2007 GOA pollock assessment, ecosystem considerations focused on estimates of the relative levels of pollock predation by pollock, Pacific cod, Pacific halibut, and arrowtooth flounder. Of these predators, pollock and arrowtooth flounder consume smaller pollock (age one) while arrowtooth, cod and halibut consume adult pollock. As it turns out, pollock fishing has a lesser effect within the ecosystem as fishing mortality is small in proportion to predation mortality for GOA pollock (Aydin <i>et al.</i> 2007). Of the predators of pollock, arrowtooth flounder has the largest impact on adult pollock, and the pollock stock assessment author notes that competition between arrowtooth and Steller sea lions for food may be underappreciated (Dorn <i>et al.</i> 2007). The above-mentioned concerns about predator biomass and the relatively low level of GOA pollock biomass motivated in part the continued application of the author's <math>F_{ABC}</math> adjustment, which for 2009 provided a 15 percent reduction from the maxABC of the stock assessment model.</p>
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Item	Comments
1	<b>Condition of Certification 1:</b> The harvest strategy can be shown to be precautionary
<b>Conclusion of Surveillance Report 3</b>	<p>This Condition relates principally to Indicator 1.1.1.5, but Indicator 2.1.1, Principle 3 Indicator 4.1.6 and, in part, Principle 3 Indicator 4.1 also relate</p> <p>The score allocated to this Performance Indicator is now raised to 90.</p> <p>This condition has now been closed.</p>

2	<p><b>Condition of Certification 2.</b> Current stock sizes are assessed to be above the appropriate limit reference point.</p>
Activity Assessed	<p>This Condition relates principally to Indicator 1.1.2.1, but Indicator 3.1.3 and, in part, Principle 3 Indicator 4.1 also relate.</p> <p>The intent is to assess whether the stock is currently “overfished”. There is no internationally agreed standard to define this. A recent FAO view is that target stocks should generally be maintained above BMSY, which should be used as a limit reference point. An alternative (but not generally accepted) view is that explicit allowance should be made for predators by increasing target and limit levels well above BMSY (e.g. the “CCAMLR” strategy). Stock levels can also fluctuate due to natural environmental variability, and this needs to be taken into account. In this regard, BMSY is an equilibrium concept and is not easily defined for a naturally fluctuating stock. In the absence of precise or agreed definitions or standards, expert judgments will be made based on the following guideposts.</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Stock assessments show the stock to be above the reference biomass with greater than 90% probability.</li> <li>• The reference biomass is above BMSY and takes into account the needs of predators.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Stock assessments show the stock to be above the reference biomass with greater than 70% probability.</li> <li>• The reference biomass is BMSY or its equivalent and takes into account the natural variability of the stock.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Stock assessments show that there is a reasonable chance that the stock is at or above BMSY or its equivalent.</li> </ul> <p><b>SCORE: 70</b></p> <p>This scoring indicator was the subject of considerable debate during the course of the SCS evaluation process. The main point of contention was the choice in the scoring guideposts of BMSY as a limit reference point, since it is used more as a target reference point in the NPFMC Tier system, with half BMSY being regarded as the limit reference point in the US National Standard Guidelines (MSST – see discussion for indicator 1.1.1.1). It was also argued by some staff at AFSC, by other staff in NMFS (Dr Pamela Mace), and by Dr Rick Deriso of the IATTC, that BMSY is in fact not an agreed limit reference point for the FAO or an internationally agreed limit reference point, as stated in the “intent” section of this scoring indicator. While it is agreed that this latter point is substantially correct, this does not in fact seem entirely consistent with the general agreement, including in the NPFMC harvest strategies, that FMSY is a limit reference point for fishing mortality (it is hard to see how BMSY can be a target if FMSY is a limit). The SCS team also noted that there are references in the international literature to BMSY as a limit reference point (e.g. Jennings <i>et al.</i>, 2001).</p> <p>Notwithstanding the academic debate, the intent in choosing BMSY as a limit reference point for Pollock was to ensure that a fishery for a species such as Pollock, which appears to be a key prey species in its ecosystem, should maintain the stocks at levels that would not jeopardize the productivity of key predator species (such as Steller sea lions). The issue of course is that there is no general agreement on what such levels should be (see detailed discussion of this issue in the preamble to the report on Principle 2).</p> <p>Another complication in scoring this indicator is that, especially for a naturally fluctuating population, BMSY is not a fixed entity, nor indeed is B100% (unfished population level) nor any fraction of this (such as BX%). It has already been noted, and is discussed in detail under Principle 2, that the Gulf of Alaska appears to be subject to decadal or longer time scale shifts in productivity (“regime shifts”), and that Pollock productivity and abundance is influenced by such changes. Stakeholders point to several concerns with regard to using BMSY. Bernstein <i>et al</i> (2002) point to the importance of trying to distinguish and account for the relative impacts</p>

of fishing and environmental influences on abundance, and Marz and Stump (2002) point to the problem of the “shifting baseline” in calculating BMSY in practice.

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

All this implies that evaluation of the fishery against this scoring indicator is not straightforward.

The 2002 assessment for the GOA stock (Dorn *et al*, 2002) shows the population to be at 28% of unfished spawning biomass, or at 24% if the risk averse assumption is made that the 1999 year class is of only average abundance (the assessment suggests it is stronger, but uncertainty in the estimate of year class strength is high as it is not fully recruited to the fishery as yet). Both these levels (28% and 24%) are well below the BMSY proxy of B35%, which is based in turn on average recruitment levels over the period from 1979 to 1999. On this analysis, the GOA stock would fail this scoring indicator (score less than 60). (The corresponding levels for the 2003 assessment are 31% and 27% of unfished levels (Dorn *et al*, 2003), still below the reference level, though indicating a partial recovery in the stock levels).

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

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

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

1. Stock size for GOA pollock would have varied almost tenfold since 1960, even in the absence of fishing (Figure 1, Appendix 3).
2. The declining trend in abundance since the early 1980s (Dorn *et al*, 2002) is also evident for the unfished stock (Figure 1, Appendix 3).
3. The lowest relative depletion level in the time series is 59% of the corresponding unfished level for 3+ biomass, and 44% of the unfished level for female spawning biomass (Table 1 and Figure 4, Appendix 3). Both are well above the B35% proxy for BMSY.
4. Exploitation rates for GOA Pollock have generally been low, although there is an overall increasing trend to the time series (Figure 3, Appendix 3), and a tendency to higher exploitation rates at lower stock sizes.

It is also interesting to note that the exploitation rate for GOA Pollock has been less than the exploitation rate for EBS (Eastern Bering Sea) Pollock in most years, although the latter is generally regarded as being in a healthier state, being at much higher stock size relative to average unfished levels (Ianelli *et al*, 2002). (However the comparison needs to be viewed with

caution. The assumption of no relationship between spawning stock size and subsequent year class strength over the range of SSBs observed to date does not appear to hold as well for the EBS stock as it does for the GOA stock).

Nevertheless, the weak status of GOA Pollock seems to be due to a long period of generally poor recruitment, rather than to exploitation rates having been too high.

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

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

Allowing that much of the decline in the GOA stock over the past 20 years is environmentally driven puts a different emphasis on the exploitation history and current status of this stock. The results in Appendix 3 suggest that the stock has been responsibly managed (generally low exploitation rates) and that the current stock level relative to where it would have been now if the stock had never been fished is relatively high (44% for female spawning biomass and 75% for exploitable biomass – Table 1, Appendix 3). Both these levels are well above the proxy B35% level for BMSY if the latter is viewed as a potentially dynamic quantity. If environmental variability is ignored and BMSY is viewed as a fixed average quantity over the period since 1977 (as in the current SAFE report), then the current stock size is well below BMSY, and the stock is overfished based on the standard suggested for this scoring indicator.

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

Which of these two views of stock status (relative to static or dynamic estimates of BMSY) should the SCS evaluation team use to judge performance against this indicator? Neither is “correct” - they just represent different ways of viewing stock status. In considering this question, the evaluation team went back to their original rationale for choosing this indicator and selecting the reference level chosen (BMSY bearing in mind that its proxy for pollock is B35%). The rationale stemmed in large part from concerns about the ecological impacts of low stock levels on predators of Pollock. The “intent” description for this scoring indicator refers both to this issue, and also to a need to take into account the effects of environmental variability. How might these two issues be reconciled?

There is strong evidence that the GOA ecosystem is highly variable and that this in turn impacts on population levels of individual species, and may also affect community structure (see discussion in preamble to Principle 2). The results in Appendix 3 and in Dorn *et al* (2003) suggest that this variability is an important feature of the dynamics of Pollock in the GOA, with population levels potentially fluctuating tenfold even in the absence of fishing. Although

the system has only been observed through one of these cycles, it seems reasonable to suppose that such variability is a natural feature of this ecosystem. If so, then predators of species such as Pollock must also have had to cope with such variability in the past. They may well be adapted to such variability, and have a variety of mechanisms (such as prey switching) to deal with it. The results in Appendix 3 (Figure 1) suggest that fishing has served to accentuate rather than fundamentally change the nature of that variability. That in itself may be of concern – with a constant exploitation rate, the low points in the cycle would be lower with fishing than without it. On the other hand, the fact that stock level falls below an average B35% level may not be of substantial concern, if such events are commonplace even in the absence of fishing.

However it seems reasonable to suppose that there ought to be a “bottom line”, a level below which it is undesirable for the stock to fall on the grounds of ecological impacts on the ecosystem, and hence below which exploitation should cease. Under the current GOA harvest strategy for pollock, that level is 20% of average unfished levels. Given the apparent level of natural variability in the stock, and the calculation that, even with a maximum exploitation rate of F75% (i.e. a target stock size of B75%) the stock would still fall below B35% almost 20% of the time (Martin Dorn, unpublished data), a 20% bottom line seems not unreasonable.

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

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

“We strongly disagree with the team’s analysis under this PI. The GOA stock should fall below the 60 SG level because its abundance estimates are dangerously low and below MSY. Your analysis involves gross speculation. The issue is not whether variability is a natural feature of the ecosystem, but how much has fishing changed the nature of that variability. This is impossible to assess definitively. As such, it is imperative to manage the fisheries in as precautionary a manner as possible regardless of what has caused the low stock size. This involves lowering TAC levels, if fishing is permitted at all. However, the Council recently *increased* the harvest level 31 percent despite the fact the GOA pollock biomass is low and below MSY. Further, relying on the strength of the 1999 year class is dangerous as many of the assumptions in calculating the stock estimate may be overestimated. Given the low biomass estimate, it would be more precautionary to leave more of the 1999 year class in the water to mature and grow.

As noted by Dayton *et al.* (2000), without reliable baseline data to compare the current state of the ecosystem to an unfished environment, the causes of ecosystem changes in a complex system can always be argued. Undoubtedly environmental forces play a large (though not well understood) role in determining the population dynamics of fish species, particularly on a year-to-year basis in a variable high-latitude marine environment, as do ecological interactions between species in the marine food web. But it must be said that no theory of “regime shifts” has shown an effect on any fish population as profound as that which is *assumed* in the stock assessment models and theory of MSY, which approximately doubles the estimated annual mortality on stocks such as pollock, by design (Field 2002).”

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

	<p>result in a more conservative harvest strategy if the evaluations indicate that is called for).</p> <p>Pope (2003), one of the external reviewers of the report, made the following comment with regard to this scoring indicator:</p> <p>“The assessment team clearly had problems with this indicator. Personally I would prefer it to refer to the limit reference point as specified by the Tier rules rather than at an absolute level. Whether the Tier rules (or for that matter <math>B_{msy}</math> based rules) are precautionary will be decided under the condition to 1.1.1.5. Similarly I would exclude predators’ needs here but deal with them robustly in the appropriate place. This interpretation would lead to a passing score here. However, using the scoring guideposts as written I think the assessment team is correct to give no more than 70. Indeed the wording of 60 might suggest a still lower score but I think this might be unjust. The problem here underlines the difficulty of biomass limits with stocks subject to large natural fluctuations. The conditions specified seem reasonable.”</p> <p>Mindful of these views, and of the additional assessment reported in Dorn <i>et al</i> (2003), the SCS evaluation team stands by its original scoring for this indicator.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, SCS requires that:</p> <p>The requirement for testing alternative harvest strategies (condition attached to scoring indicator 1.1.1.5) needs to take account of the considerations discussed in the evaluation for this indicator. In particular, harvest strategies should be tested for robustness against a variety of assumptions about the role of natural environmental variability on GOA stock dynamics, and performance measures should include the impacts of low stock sizes on predators of pollock. Alternative harvest strategies (harvest control rules) should be considered that provide a better balance between stock protection, minimizing impacts on predators, and exploitation. Specifically, the testing of alternative harvest strategies should evaluate whether the criterion that the stock should remain above the static version of B20% provides sufficient protection for predators of pollock.</p> <ol style="list-style-type: none"> <li>1. The SSC (or a suitable independent expert) should review and comment on the estimates of stock depletion in Appendix C of Dorn <i>et al</i> (2003) in relation to the impacts of fishing on recruitment variability and stock abundance.</li> <li>2. The GOA plan team should recommend strategies to improve reliability of the annual abundance surveys, particularly in and around Shelikof Strait, to understand the interannual variability in spawning location and stock behaviour, also noting the recommendations in Godo (2003).</li> </ol>
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<p><b>APA Activity</b></p>	<p><i>APA maintains its long-standing objection to the Principle One Performance Indicator (PI) 1.1.2.1 and the associated Scoring Guideposts.</i></p> <p><i>Our objection centers squarely on the stock-biomass-based nature of both the PI and its Scoring Guideposts. The MSC certification is intended as an independent benchmark for best practices in fisheries management and not a measure of fish-stock biomass at any particular moment in time. In our view, it is the management actions that remain under the control of the fishery management system, and so it is the management actions based on a given level of stock biomass and associated ecosystem conditions that should be the subject of MSC standards and evaluation (i.e., the fishery assessment, including the research tasks on which it must rest, and the harvest control rule).</i></p> <p><i>We note that PI 1.1.2.1 is the only Principle One indicator that is not focused on management actions, an observation also made by the MSC Objections Panel in their recent review of stakeholder objections concerning the low stock size for GOA pollock (paragraph 3.1). Furthermore, we note the applicability of MSC Principle One, Criterion One, as referenced in the MSC Objections Panel Report. Twenty-two performance indicators were developed to provide an operational interpretation of Criterion One, and they appropriately focused “on testing and improving the fishery assessment and harvest control rule.”</i></p> <p><i>“(T)he fishery shall be conducted at catch levels that continuously maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.”</i></p> <p><i>The focus in this Criterion is on the conduct of a fishery “at catch levels” — not at stock biomass levels. While we disagree with the Objections Panel that BMSY is a suitable limit reference point for biomass in interpreting MSC Principle One, we agree with the Panel that constant B20% was considered by the certification team in their scoring of MSC Principle One. In fact, this single constant value for B20%, which provides a fixed minimum biomass below which no directed fishing is allowed, was considered explicitly in the scoring of PI 1.1.1.3 by the certification team. (The harvest control rule results in appropriate reductions in exploitation rate at low stock sizes.)</i></p> <p><i>As such it seems incongruous that the Objections Panel would remand the certification report back to the certification team, essentially to add an additional component to the 60 Scoring Guidepost of PI 1.1.2.1 which was plainly considered in the scoring of PI 1.1.1.3. In our opinion, this situation results from the flaw in the rational basis for the PI 1.1.2.1 described above, and the resulting confusion in the interpretation of Principle One Criterion One that it generated, and which formed the basis of the Objection Panel’s consideration of the low stock biomass issue</i></p> <p><i>We raise this issue to continue the dialogue with the certification body about our concerns during the annual surveillance audits and to address comments of the MSC Objections Panel Report for the GOA pollock fishery. With respect to the latter, paragraphs 3.20 and 5.7 of the Objections Panel report advises that under current MSC procedures there is reason to believe that the GOA fishery could be de-certified if the stock biomass drops below the constant B20% threshold “as it approaches the low point in the production cycle.”</i></p> <p><i>Given the current harvest control rule, which under PI 1.1.1.3 received a score of 85, directed fishery would be suspended if the biomass drops below such a threshold. The industry is on record supporting the current harvest control rule as a means to protect other ecosystem consumers of pollock. We do not agree that having the management system take the appropriate, precautionary action, however, should result in de-certification of the fishery. Such action is fundamentally at odds with the stated purpose of the MSC program, which is to recognize precautionary, ecosystem-based management systems. In sum, because PI 1.1.2.1 is focused on stock biomass and not catch levels, implementing the appropriate management action could be welcomed by loss of MSC certification.</i></p> <p><i>With that background, the following is APA’s planned course of action .</i></p>
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	<p><i>Condition #2 (provision #1) will be met under the GOA Action Plan response to Condition #1 (see above).</i></p> <p><i>Condition #2 (provision #2) recommends that the SSC review Appendix C of the 2003 GOA pollock assessment found in the 2003 GOA SAFE report. Within one month of issuance of the certificate, APA will provide the contracted certification body with the SSC minutes from the December 2003 meeting for review and consideration of whether the information provided meets this provision of the condition. The information provided should contain not only the final determination by the SSC, but as stated in the condition a review of the information such that the certification body can determine if the review satisfied the provision in this condition.</i></p> <p><i>APA believes that the minutes of the meeting go a long way to meeting provision #2 under condition 1.1.2.1. The SSC mentioned the many aspects of conservatism built into the 2003 assessment, in particular, an even more risk-averse harvest policy mandated by the 2001 Steller sea lion reasonable and prudent alternative management (protection) measures. The SSC agreed with the extremely conservative approach recommended by the authors of the SAFE report and the GOA Plan Team given concerns over the low level of the pollock stock, and the NPFMC subsequently adopted the SSC recommendation.</i></p> <p><i>With regard to that part of Condition #2 (provision 3) for improving the reliability of the annual pollock acoustic abundance survey, during 2004 the assessment authors and the AFSC Midwater Assessment and Conservation Engineering (MACE) staff collaborated on the drafting of a five-year plan to investigate alternative strategies to improve the reliability of the GOA acoustic survey. The draft strategy was motivated by the 2003 GOA pollock assessment review of Godo (2003), and was presented to the GOA Plan Team at its September, 2004 meeting.</i></p> <p><i>In brief, the strategy developed will provide for an evaluation of the strengths and weaknesses of a more expansive spawning season survey versus the implementation of a summer survey that would cover most if not all of the western, central, and eastern GOA management areas. Within one month of the issuance of the GOA pollock certificate, APA will provide to the certification body the strategy developed by the AFSC MACE Program to improve the reliability of the GOA acoustic survey</i></p>
<p><b>Conclusion of Surveillance Report 1</b></p>	<p>There is reasonable work being done on this Condition. Progress on this condition should be fully reported prior to the second surveillance audit.</p>
<p><b>Conclusion of Surveillance Report 2</b></p>	<p>This Condition relates principally to Indicator 1.1.2.1, but Indicator 3.1.3 and, in part, Principle 3 Indicator 4.1 also relate. Where a Performance Indicator is addressed by multiple conditions, a notional score of 80 will be required and applied to those elements of the Performance Indicator addressed by a condition being closed. The final score for the Performance Indicator will then be determined when the last relevant condition is closed.</p> <p>The first part of this Condition will be met if the review of the work by Dr. Boyd concludes that the current harvest rule does not jeopardize food requirements of predators. This will be re-assessed at the next surveillance audit.</p> <p>The North Pacific Fishery Management Council's Scientific and Statistical Committee (SSC) have reviewed Appendix C of the 2003 GOA pollock assessment in accordance with the second part of Condition 2, noting the many aspects of conservatism built into the 2003 assessment, and in particular, the more risk-averse harvest policy than that mandated by the 2001 Steller sea lion reasonable and prudent alternative management (protection) measures.</p> <p>Professor Boyd's reports on the possible impacts of the pollock fishery on regional abundance of SSL food and the consequences of such effects on SSL recovery meet the requirements of part 3 of Condition 2.</p> <p>The annual Surveillance Audit should continue to monitor the survey coverage and use of survey information in the assessment. As long as practices are comparable to or better than practices in 2006 onward these components of the condition can be considered closed. There</p>

	<p>appears to be some uncertainty about the long-term availability of research survey vessels. However, industry is aware of these issues and is prepared to cooperate with NMFS in ensuring adequate survey effort and appropriate designs continue to be implemented.</p>
<p><b>Conclusion of Surveillance Report 3</b></p>	<p>Using all the information available, it is possible to conclude that the management response is fully appropriate, and the stock is highly likely to increase to above the B35% during the period when the current audit review will apply. Moreover, the short term risk to the stock and ecosystem is not considered to be substantively increased at the estimated SSB of 335,000 mt, compared to the estimate of B35% of 388,000 mt.</p> <p>The next audit of this fishery needs to consider carefully the status of the resource, to confirm that the expected recruitment to SSB was realized, and the conservation benefits from the harvest control rule were achieved. One key property of the thoroughly tested harvest control rule is that conservation of the stock should be robust to exactly these times of occasional revisions of estimates of the size of recruiting year-classes. The next audit will provide important insight into whether that property is truly present. It is expected that this Condition will be closed out within the life of the present certificate.</p>
<p><b>APA Progress Report</b></p>	<p><b>Stock Operational Model</b>  Recruitment of GOA pollock is more variable than eastern Bering Sea pollock, and among North Pacific groundfish stocks with age-structured assessments, GOA pollock ranks third in recruitment variability after sablefish and Pacific Ocean perch. However, unlike sablefish and Pacific Ocean perch, pollock have a short generation time (less than ten years), so that large year classes do not persist in the population long enough to have a buffering effect on population variability. Because of these intrinsic population characteristics, the typical pattern of biomass variability for GOA pollock will be sharp increases due to strong recruitment, followed by periods of gradual decline until the next strong year class recruits to the population. (Figure 1.21 in Dorn <i>et al.</i> 2008). GOA pollock is more likely to show this pattern than any other groundfish stock in the North Pacific due to the combination of a short generation time and high recruitment variability (Dorn <i>et al.</i> 2006).</p> <p>Analysis of recruitment and spawner productivity shows that since 1980 strong year classes have recruited every four to six years, and that strong and weak year classes have been produced at high and low levels of spawning biomass. For example, the 1972 year class, one of the strongest on record, was produced in a year with a spawning biomass estimate close to the current level (Figure 1.23 in Dorn <i>et al.</i> 2008).</p> <p><b>Stock Status</b>  The 2008 GOA pollock assessment shows a begin-year age 3+ biomass estimate of 537,000 tons and the spawning biomass at B<sub>27%</sub>. For 2009, projected age 3+ biomass is 639,000 tons and the spawning stock is expected to drop to 22 percent of unfished biomass. The dip in spawning biomass is expected to be short-lived, as projections indicate an increase after 2009 (Figure 1.26 in Dorn <i>et al.</i> 2008). The results of an analysis of the uncertainty in future (2009-2013) spawning biomass is shown in Figure 1.25. The probability of the spawning biomass dropping below B<sub>20%</sub> is highest in 2009 (12 percent), and is less than one percent in subsequent years. During 2002-2008 spawning biomass has fluctuated from 300,000 to 400,000 tons and back to 300,000 tons while the age 3+ biomass has declined by 50 percent.</p> <p>The short-term concern with GOA pollock is the low survey estimates of spawning biomass for Shelikof Strait and other spawning areas in 2007 and 2008. In previous years, concerns about spawning activity in Shelikof Strait were lessened by additional winter survey efforts which, in aggregate, showed estimates of spawning biomass that approximated the model estimate. In 2008, while estimates of biomass in Shelikof Strait and the Shumagin area remained close to their 2007 minimums, the other surveyed areas showed declines. As such, for 2008 the survey estimate of spawning biomass for all GOA areas together was only 34 percent of the model estimate.</p> <p><b>Stock Recruitment</b>  The 2008 estimates of age-one pollock in both the Shumagin area and Shelikof Strait were relatively large, suggesting that the 2007 year class is both abundant and widespread. The age-</p>

one estimate from Shelikof Strait is the fifth largest out of 25 surveys, which also suggests that recruitment from the 2007 year class is likely to be above average, although its FOCI prediction is just average (Dorn *et al.* 2008). The 2008 size composition from the ADF&G groundfish survey shows a mode at 44 cm, which is consistent with a the recruitment of a strong year class (or classes) to the mature component of the population sampled by this survey (Figure 1.8 in Dorn *et al.* 2008). The estimated pattern of stock recruitments (Figure 1.21 in Dorn *et al.* 2008) shows a pattern of historic recruitments that matches the evolution of recruitments recently suggesting that the assessments are tracking year-class strengths reasonably, although individual survey estimates of recruiting year-class strengths are more variable.

### Stock Yields

The TIER 3 harvest control rules provide for a “buffer” between the maximum target fishing rate and the proxy maximum sustainable yield (MSY) fishing rate ( $F_{35\%}$ ), as required by the 1996 US Sustainable Fisheries Act. The buffer provides a margin of safety such that assessment errors are less likely to result in future estimates of past stock biomass which show past harvest rates greater than MSY fishing (planned harvests cannot be greater than MSY due to the buffer). For the TIER 3 rules the size of the buffer decreases as spawning biomass drops below  $B_{50\%}$ . Below the  $B_{40\%}$  benchmark, true spawning biomass cannot be more than about eight percent lower than estimated biomass to avoid indications of prior overfishing (Dorn *et al.* 2001).

Because there will always be some probability of exceeding the  $F_{40\%}$  rate due to imprecise stock assessments, and because the GOA pollock biomass has steadily declined since the mid-1980s for reasons that are incompletely understood, the assessment authors developed a “constant-buffer” harvest control rule. The rule adjusts the balance between stock protection, potential impacts on pollock predators, and fishery catches by increasing the “spawning-biomass space” between the maximum acceptable biological catch (maxABC) and OFL fishing rates (Figure 1.23 in Dorn *et al.* 2006). Since 2002 the recommended ABCs have used the constant-buffer rule as a further measure of precaution in setting GOA pollock harvests. For 2009 the constant-buffer rule indicated an ABC (TAC) 15 percent lower than the maximum ABC, and a decrease of 19 percent from the 2008 TAC.

The GOA pollock stock assessment team draws on extensive sampling and knowledge of GOA climate and ecosystem changes in developing its understanding of GOA pollock stock dynamics and the assessment tools required to sustainably manage the harvest. However, GOA pollock spawning biomass has declined more or less continuously from the mid-1980s until the beginning of the current decade for reasons that are not well understood. Since about 2000 the spawning biomass has been stable, although at a low level last thought to have occurred during the 1960s. Because recruitment variation is high, it is difficult to anticipate future development of the spawning biomass. Dorn *et al.* (2008) show projections for increases after 2009.

During the period 2002-2008 GOA pollock harvests averaged 60,000 tons (total of 420,000 tons). For most of this time harvests have been lower than the maxABC provided by the assessment model. It cannot be argued that GOA pollock has not been managed sustainably, although prior assessments provide witness to "occasional revisions of estimates of the size of recruiting year-classes." And over this time spawning biomass appears to have fluctuated while the immature component of the age 3+ biomass has declined by more than 50 percent. With spawning biomass fluctuating but with varying strengths of recruiting year classes but showing no trend around a level above all biologically based limit reference points applicable to stocks with variable recruitment dynamics, the management strategy may be considered to be working as designed (Figure 1.24 in Dorn *et al.* 2008), with stock conservation robust to errors of measurement in recruitments. For GOA pollock, the period over which the spawner biomass may be expected to fluctuate above and below the  $B_{40\%}$  benchmark is influenced greatly by the frequency of strong recruitments. The reduced harvests have allowed the fishery to continue at a sustainable level as managers wait for a strong year class to recruit. The historic pattern of recruitments (Figure 1.21 in Dorn *et al.* 2008) indicates that this strategy is likely to succeed.

	<p><b>Stock Research</b></p> <p>Modelling the effects of climate change on the GOA pollock stock has been a focus of research at the Alaska Fisheries Science Center (AFSC) for the past 20 years. Recently, a mass-balance food-web model allowed some assessment of forage and predation by evaluating “bottom-up” and “top-down” forcing mechanisms (Boldt 2006). The effort was made to support development of indices and thresholds of “surplus” production and predation for Alaska pollock stocks. Historically, significant research effort was aimed at finding environmental factors that might forecast pollock recruitment (FOCI - Fisheries-Oceanography Coordinated Investigations). These measurements are summarized by Boldt (2008) and Dorn <i>et al.</i> (2006). An on-going study of the links between ichthyoplankton dynamics and the GOA pelagic environment was recently updated (Boldt 2006). A study of GOA eddy kinetic energy and its effects on the distribution of nutrients is reported by Boldt (2008).</p>
<p><b>Observations</b></p>	<p>When this condition was issued, Bmsy was being used as a default limit reference point. This was consistent with the general guidance from the World Summit on Sustainable Development in Johannesburg (<a href="http://www.un.org/events/wssd/">http://www.un.org/events/wssd/</a>), and no well-tested alternative was available for this stock. However, well before the time of initial certification, Bmsy was widely criticized by fisheries population experts as an unstable management reference point, particularly for stocks with large inter-annual variation in recruitment (Mace 2001), including Gulf of Alaska pollock. The shortcomings of the Bmsy reference point was acknowledged by the assessment panel at the time, as reflected in the call in Condition 3 for development and testing of a robust harvest control rule for this stock.</p> <p>That work was undertaken immediately, and a new control rule was adopted in the period of certification. Testing continued until the robustness of the control rule to protect the productivity of the stock was demonstrated in a full range of plausible conditions. After review of the simulation testing the associated conditions were closed during the 2008 audit report (see below). The fully-tested control rule includes a B5% anchor to the reduction in F, which commences at B40% (273,000 t). However closure of directed fisheries triggered by the Minimum Stock Reference, which is at approximately B17%.</p> <p>During the period of evaluation the fishery has been managed with that control rule and triggers. In the most recent years here have been a series of four consecutive weak recruitments to the stock. This is the longest sequence of weak recruitments in the time series, and therefore poses an extreme test of the control rule. Management has succeeded in reducing harvest rate each year to keep the estimated stock size above the B20% level (estimated at B22% in the 2008 assessment), ensuring that there is a very low likelihood that the stock is really below B17%, given the uncertainties in the assessment.</p>
<p><b>Conclusion</b></p>	<p>The combination of a well-tested harvest control rule and strong evidence that management is successful in applying the control rule under exceptionally adverse environmental conditions demonstrates that management of the fishery is in full compliance with the MSC standards for sustainable use of the target species.</p> <p>On the basis of the above commentary, and in recognition of the intensive science and management efforts directed at this fishery, the score associated with the Performance Indicator 1.1.2.1 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Stock assessments show the stock to be above the reference biomass with greater than 70% probability.</li> <li>• The reference biomass is BMSY or its equivalent and takes into account the natural variability of the stock.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Stock assessments show the stock to be above the reference biomass with greater than 90% probability.</li> <li>• The reference biomass is above BMSY and takes into account the needs of predators.</li> </ul> <p>This performance indicator is re-scored to 80 and the Condition is closed.</p>

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<b>3</b>	<b>Condition of Certification 3.</b> Stock assessments explore sensitivities to assumptions, parameters and data, and key sensitivities are taken into account in the harvest strategy.
<b>Conclusion of surveillance report 2</b>	This Condition relates principally to PI 1.1.2.3.3. PI 1.1.2.3.5.1 also relates. This condition was considered closed at last year's surveillance audit.

4	<p><b>Condition of Certification 4.</b> There is a management plan with ecosystem considerations that identifies impacts of the fishery on the ecosystem and sets reasonable upper bounds for the identified impacts.</p>
Assessed Activity	<p>This Condition relates principally to Indicator 1.1, but Principle 3 Indicator 1.2 also relates</p> <p><b>Intent statement:</b> Pollock has a lower caloric density than that of many other ‘food fish’. As a consequence, it may be a less suitable food where animals require a high energy density diet in order to promote rapid growth of their young or to increase their own energy reserves. This has led, for example, to the ‘junk food hypothesis’ that suggests that pollock are nutritionally inferior to alternatives such as herring or myctophids, and that populations of top predators might increase if able to feed on large stocks of herring but may decrease if the food web is dominated by pollock (as at present). But in the Gulf of Alaska, pollock represent a high proportion of the overall food fish biomass, and form a large part of the diet of many ‘top predator’ marine mammals and seabirds. Given the importance of pollock as the primary food for many ‘top predators’ in this ecosystem, we consider that an ecosystem approach is especially important for this fishery (more so than for example in fisheries for other gadoid species that form a small part of the diet of wildlife where the ‘food fish’ of top predators tends to be gadoid prey rather than the gadoid stock itself). Thus despite the possible lower nutritional quality for food-stressed seabirds or marine mammals of pollock relative to herring, we consider the ecological role of pollock to be somewhat more similar to that of capelin in the Barents Sea, sandeel in the North Sea, krill in the Southern Ocean, than to the role of cod in the Barents Sea, cod, haddock, whiting and saithe in the North Sea, or hoki in New Zealand. Our aim with this indicator was therefore to identify whether management of the pollock fishery uses an ecosystem approach to management, based on a knowledge of the ecological relationships between the fishery, fish stock and other components of the ecosystem, and limits impacts of the fishery to below levels that can be identified as damaging to the wider ecosystem (as distinct from limits set on the basis of single stock management alone such as the need to maintain SSB to achieve adequate recruitment). In particular we were looking to see whether research had identified ecosystem effects of the fishery, whether these effects were taken into account in management decisions (such as setting ABCs and TACs), and whether a precautionary approach was used where information on impacts or the needs of other ecosystem components was poor. Therefore we developed the following scoring guideposts:</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a detailed ecosystem management plan based on well-understood functional relationships between the fishery and components of the ecosystem.</li> <li>• This forms the basis for a fishery management strategy that restrains impacts on the ecosystem within defined bounds such as using 90% confidence intervals for setting ABCs in the single species context, and establishing a decision rule in the multi-species context similar to that employed in CCAMLR for krill, which explicitly adjusts the single species fishing level downward to account for the needs of other krill consumers in the ecosystem.</li> <li>• These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high. They address risks associated with point estimates of ABCs and/or address the needs of dependent and related species explicitly.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a management system with ecosystem components based on general knowledge of ecological relationships. This contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity.</li> <li>• The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem.</li> <li>• Where uncertainty is high, management to restrain impacts is precautionary.</li> </ul> <p><b>60 Scoring Guidepost</b></p>

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

### SCORE 75

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

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

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

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

The continued high proportion of pollock catch taken in SSL critical habitat is of concern. In the GOA the harvest rate of pollock is relatively low by comparison with that in other fisheries for large gadoids. The harvest rate has been around 13% per annum in 1997-2001 (Dorn *et al.* 2002), which is around half the target rate for Icelandic cod, for example. Thus the fishery can correctly claim to be precautionary in setting a relatively low harvest rate. Nevertheless, about

70% of this harvest is taken from within SSL critical habitat, although the value varies considerably from year to year. For example, in 1999 harvest inside CH was 82.8% while in 2002 harvest inside CH was 54.9%, but the lowest in recent years was around 50% in 1991 and the trend in this percentage from 1991 to 2003 shows no consistent direction of change over the period (Figure 2.1.b).

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

We are aware of ongoing studies looking at the effects of fishing on Pollock distribution and density within SSL critical habitat. However, the effectiveness of constraints on fishing in areas close to Steller sea lion rookeries and haul-outs cannot yet be ascertained. Even the validity of the concept of 'critical habitat' for SSL is quite unclear. There is a lack of data on the extent to which SSL forage within 'critical habitat'. Initial radio tracking studies have provided some interesting data on this as they show where SSL may occur, but do not clearly discriminate between foraging and non-foraging distribution and behaviour. More recent studies provide more detailed information, but there still appears to be significant uncertainty about the possible effects of fishing on foraging success by SSL inside and outside 'critical habitat'. There remains an urgent need to determine whether prey abundance within SSLCH (or indeed in larger areas around rookeries and haul-outs) affects the SSL population trajectory at the level of individual rookeries/haul-outs, and if so, whether the high take of pollock within SSLCH affects prey abundance for foraging Steller sea lions.

The initial draft PSEIS (now being redone) reports 'Conditionally significant adverse impacts on the three primary pinniped species (Steller sea lions, northern fur seals, harbor seals) due to harvest of prey species; Conditionally significant adverse impacts on the primary pinniped species are identified due to spatial/temporal concentration of the fishery' and 'Cumulative effects are identified for prey availability and spatial/temporal removal of prey for Steller sea lion, northern fur seal, and harbor seal. These effects are conditionally significant adverse based primarily on competition for prey'. This is reflected in the 3 December 1998 BiOp and the November 2000 BiOp determining that the BSAI and GOA pollock fisheries, as projected for 1999 through 2002, were likely to jeopardize the endangered western population of Steller sea lions and destroy or adversely modify critical habitat designated for this population (PSEIS p2.9-20). In contrast, the October 2001 BiOp using the initial telemetry data reversed the conclusion of jeopardy. Moreover, the draft addendum to the 2001 BiOp, prepared to meet the requirements cited by Judge Zilly continues to support the conclusion of no jeopardy.

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

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

Regarding specific points in the 80 Guidepost, we accept that the management system could assist fishery managers in making adjustments to reduce impacts on the ecosystem, through the qualitative approach of annual 'Ecosystem considerations' chapters and that aspects of management are precautionary. However, we feel that the fishery falls below the 80 guidepost

	<p>for the variety of broad reasons outlined in the paragraphs above, and specifically because it remains unclear whether a lower limit reference point of B20 provides an adequate limit to stock exploitation to ensure an adequate biomass of pollock for natural predators, and because the high level of exploitation of pollock within SSLCH is of concern (and especially at a time when the stock biomass is at such a low level relative to predicted unfished biomass).</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, the fishery is required to specifically and explicitly develop and implement a plan for using the information contained in the Ecosystem Chapter of the SAFE document to develop ABCs for the pollock fisheries.</p> <p>Fisheries science is still developing methodologies for introducing environmental parameters into fisheries models and the state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further such development, and so some time is required to allow the necessary developments (see below).</p> <p>The plan must show how the authors of the 'Ecosystem Considerations' chapter explicit recommendations will be used in setting limits on ABCs based on each of the ecosystem data sets under review in the chapter where the data indicate that a constraint on pollock harvest may be an appropriate response to the pattern displayed by the data set. The evaluation team would request consideration of introducing more use of scenario planning in developing management strategies that are robust under several possible futures.</p>
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<p><b>APA Activity</b></p>	<p><i>This Condition and Action Plan response are identical for the BS/AI and GOA. The certification report notes that the “state of current scientific knowledge remains insufficient to accommodate the conditions required under this indicator without further...development (of fisheries science)”. Importantly, the Final Report also notes repeatedly that management in the North Pacific is widely viewed as progressive and precautionary. Recognizing that the AFSC is consistently recognized for its leading edge practices, APA proposes this step-wise approach to meeting the Condition.</i></p> <p><i>APA will have a qualified individual, including contracting with an outside expert if necessary, review the literature to evaluate what constitutes state of the art practices in incorporating ecological indices into estimation of ABCs. Furthermore, APA will assess the extent to which AFSC incorporates such information into its annual SAFE report recommendations for groundfish fisheries, including recommendations on the pollock ABC.</i></p> <p><i>Based on its review of existing knowledge and methodologies, APA will identify in what areas, if any, AFSC’s analysis could be enhanced. APA will have the report peer reviewed by at least one expert chosen in consultation with the certification body. APA will present its findings to the certifier at the first annual audit, and if the certifier agrees that the report is appropriate, APA will share its findings with AFSC and urge the agency to consider including such revisions in its annual SAFE reports. Furthermore, prior to the first annual audit APA will meet with AFSC staff to better understand the resources available to the agency and developments in ecological theory and provide to the certifier an assessment of the AFSC’s long-term plan for further incorporating ecological indices in the ABC setting process.</i></p>
<p><b>Conclusion of Surveillance Report 1</b></p>	<p>Progress to date is satisfactory and is clearly moving towards the objective of including ecosystem considerations in the setting of ABC’s. In light of the comments above, the assessment team would propose to carry out specific discussions with relevant NMFS and APA staff during the second surveillance audit to determine further progress in 2006 and the latest status of current plans to achieve this objective. The audit team would then review Timescales relevant to this condition.</p>
<p><b>Conclusion of Surveillance Report 2</b></p>	<p>Progress is excellent in investigating the potential ecological impacts of the Pollock fishery on the Gulf of Alaska ecosystem. It remains necessary to specify the “reasonable upper bounds” on the impacts considered most likely and those considered most potentially serious for the ecosystem, and have these limits entrenched as far as possible in the management rules for this stock. Once this is achieved the condition would be met. The annual surveillance audit would then be expected to evaluate the fishery management and operations relative to these ecosystem limits, as well as limits based on properties of the Pollock stock itself.</p> <p>Compliance with this condition remains on-target and the condition is expected to be closed within the term of the present MSC certification.</p>
<p><b>Conclusion of Surveillance Report 3</b></p>	<p>This Condition, taken as written, is sufficiently inclusive that it might never be satisfied. There is always more that can be studied about ecosystem structure and function, and direct and indirect interactions of ecosystem components are sufficiently numerous and complex that there will always pathways of potential detrimental impacts of a fishery that are not well understood and not well quantified. However, it is legitimate to approach the Condition in the context of asking if enough is known to management the fishery with a low risk of serious adverse impacts on ecosystem dynamics, and is there evidence that the knowledge is being used appropriately in management.</p> <p>Compared to the Condition and the audit report last year, the outstanding incomplete item is to have scientifically determined limit reference points on the ecosystem indicators. However, at least two different international workshops in 2007 have concluded that aside from rare and exceptional circumstances, the scientific community is not yet in a position to provide consensus guidance on how limit reference points should be positioned on many types of ecosystem indicators. This is not an issue of lack of data but one of lack of clarity about the ecological conditions that should be reflected in a limit reference point for indicators of trophodynamic status, community structure, etc. Hence the absence of limit reference points for ecosystem indicators used in association with the Pollock assessment, advice, and management</p>

	<p>is reflecting the state of the scientific discipline and not an inadequacy in this particular case. Rather, the range of “typical” conditions for the BSAI and GOA are reasonably known for the most important ecosystem indicators, and the NOAA assessments suggest that the ecosystems are within their normal range of variation. Hence the ecological condition supported by this condition can be considered to be met. The Condition itself can be closed. The regular review of the SAFE report, the scientific advice, and the management plan should include particular attention to the Ecosystem Considerations component, as part of the annual audit of the fishery.</p> <p>On the basis of the above commentary the score associated with the Performance Indicator 1.1 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a management system with ecosystem components based on general knowledge of ecological relationships. This contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity.</li> <li>• The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem.</li> <li>• Where uncertainty is high, management to restrain impacts is precautionary.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a detailed ecosystem management plan based on well-understood functional relationships between the fishery and components of the ecosystem.</li> <li>• This forms the basis for a fishery management strategy that restrains impacts on the ecosystem within defined bounds such as using 90% confidence intervals for setting ABCs in the single species context, and establishing a decision rule in the multi-species context similar to that employed in CCAMLR for krill, which explicitly adjusts the single species fishing level downward to account for the needs of other krill consumers in the ecosystem.</li> <li>• These bounds are set at reasonable levels and are increasingly precautionary where uncertainty is high. They address risks associated with point estimates of ABCs and/or address the needs of dependent and related species explicitly.</li> </ul> <p>We consider that the performance of the fishery now clearly lies above this: there is a management system with ecosystem components based on general knowledge of ecological relationships, this contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity; The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem; and, where uncertainty is high, management to restrain impacts is precautionary.</p> <p>The score allocated to this Performance Indicator is now raised to 80.</p> <p>This condition has now been closed and the outcomes of ongoing associated work will be reviewed as a function of annual surveillance audits.</p>
<p><b>Observations</b></p>	<p>This condition was closed last year, based on evidence that, “...there is a management system with ecosystem components based on general knowledge of ecological relationships, this contains explicit management objectives to understand and control impacts on trophic relationships, community and habitat structure and biodiversity; The management system assists fishery managers in making adjustments to reduce impacts on the ecosystem; and, where uncertainty is high, management to restrain impacts is precautionary.” Nothing has occurred in the 2008-2009 period that would require this decision to be altered.</p>

5	<p><b>Condition of Certification 5.</b> Assessments are conducted to identify and estimate impacts of the fishery on habitats, especially on essential fish habitat (EFH) or critical habitat for protected, endangered, threatened or icon species, which are necessary to manage the fishery to minimize identified impacts.</p>
Assessed Activity	<p>This Condition relates principally to Indicator 1.2.1.</p> <p>The intention of this performance indicator is to evaluate the extent to which the fishery demonstrates that it does not have unacceptable impacts on important habitats that might be vulnerable to alteration by the fishery.</p> <p>Elements considered in scoring include:</p> <ul style="list-style-type: none"> <li>• The effects of fishing on the habitat structure and productivity in fished areas, especially in areas used for spawning by fish.</li> <li>• The effects of fishing on foraging economics of predators utilizing the fished area</li> <li>• The effects of bycatch and discards/discharges on habitat structure and productivity in fished areas.</li> <li>• Information on the extent of lost fishing gear and any physical damage caused to habitats.</li> <li>• Information on the discharge of processing wastes, and their effects on the physical environment.</li> <li>• Management response to these collected data.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Important adverse effects of trawling on benthic and pelagic habitats are measured at intervals on a programmatic basis.</li> <li>• Particular attention is given to effects of trawling on vulnerable habitats such as those inhabited by corals, and essential fish habitat or fish spawning areas.</li> <li>• Impacts of fishing on food-fish abundance and distribution are measured, in particular as they affect availability of food for consumers such as endangered, threatened, protected, or icon species.</li> <li>• Effects of discards and waste discharges on habitats are measured at intervals on a programmatic basis.</li> <li>• Quantities of gear lost are recorded, and the impact of lost gear on habitats is measured.</li> <li>• This information is presented in documents that are made available to stakeholders.</li> <li>• Responsive management changes occur as a direct result of assessment findings.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• The effects of trawling on benthic and pelagic habitats have been assessed and the results presented in documents available to stakeholders.</li> <li>• Particular attention is given to vulnerable habitats such as those inhabited by corals and those providing essential fish habitat.</li> <li>• Impacts of fishing on food-fish abundance and distribution have been considered and presented in documents available to stakeholders.</li> <li>• Effects of discards and waste discharges have been considered and presented in documents available to stakeholders.</li> <li>• Gear loss has been reviewed and impacts on habitats considered and presented in documents available to stakeholders.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <p>Adverse effects of trawling on habitats, especially on essential habitat for fish or critical habitat for protected, endangered, threatened or icon species, are documented by sporadic investigations, but many of these are not in the public domain. Coverage of topics is incomplete. Quantitative estimation of impacts is therefore subject to much uncertainty.</p>

**SCORE 79**

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

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

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

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

The frequent alterations to RPAs intended to reduce the impact of pollock fishing within SSLCH is consistent with this lack of knowledge; However, scientific data evaluating the efficacy of each RPA were lacking at the time of this report, and therefore it seems impossible to assess whether any one set of RPA conditions is more successful than another in mitigating impacts. Empirical evidence from catches taken within SSLCH shows that the various RPAs have not significantly reduced the proportion of the pollock catch taken from SSLCH (see Figure 2).

The analysis of telemetry data by NMFS summarized in the addendum to the 2001 BiOp led NMFS to conclude that all of SSL critical habitat (0-20 nm) is not used equally. Instead, NMFS draws the conclusion that 0-3 nm and 3-10 nm are used significantly more than 10-20 nm, so that fishing inside SSLCH can be allowed using a zonal approach. However, this view was based on preliminary and incomplete analysis of new telemetry data and the scientific basis for this conclusion has not been subject to peer review. Subsequently, NMFS has revised its interpretation of the telemetry data in the light of findings by Judge Zilly that 'NMFS's determination that the near shore zone of critical habitat (3nm to 10 nm) is 3 times more important to the foraging needs of Steller sea lions than the offshore critical habitat (10 nm to 20 nm) was not supported by the filtered telemetry data cited by NMFS' (NMFS, 2003).

NOAA Fisheries did use "filtered" telemetry data in the 2001 Biological Opinion as well as in the Supplemental Analysis that the agency submitted to the Court on 19 June 2003 (the

“Supplement”). The filtering technique utilized in the Supplement, however, was more refined than that utilized in the 2001 BiOp.

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

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

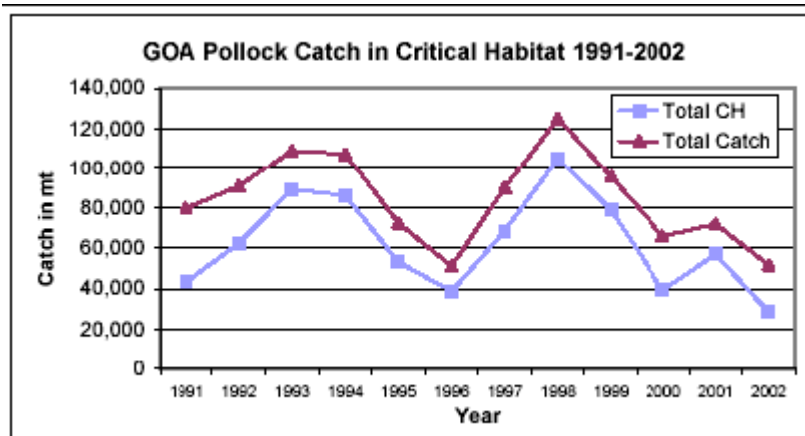


Figure 2.1 .b GoA pollock catch in SSLCH 1991-2002 (from NMFS, 2003).

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

Analyses of fishery patterns in 2002 indicate that the present RPA fishery mitigation plan allows catches in critical habitat to remain high or to rise to formerly high levels that existed prior to the determinations of jeopardy and adverse modification in the 1998 and 2000 biological opinions. (NMFS 2003 Supplement to the Supplemental October 2001 BiOp, pp. 23-24; Tables III-2, 3, 4, 5, 9; Figures III-1, 2, 3). Given that the competing hypotheses associated with availability of pollock in SSLCH cannot be sorted, the continued high harvest from SSLCH has attracted criticism from several environmental groups as being less precautionary than they consider appropriate, and provides a strong case for more and continued detailed research to test these hypotheses.

Apparently there is a lack of assessment of impacts of lost gear on habitat. According to the APA submission to the evaluation team (p16), 'no formal programs exist (sic!) at present to assess fishing gear loss and its concomitant direct and indirect effects on habitats in Alaska'.

Although rates of discarding from the pollock fisheries are low compared to those in many other fisheries (Alverson *et al.*, 1994), and can reasonably be assumed to have a negligible effect on benthic habitats and communities, the extent to which the provision of discards as a novel food supply for scavenging seabirds alters their habitat, behaviour and spatial distribution, has apparently not been assessed in the GOA. While a discarding rate of only ca 1-2% of total catch is exemplary, this represented over 1,000 t of fish discarded each year 1998-2000 (Bernstein *et al.*, 2002, Table 8). This is not a trivial amount of food to be providing to scavenging marine animals. In other parts of the world, there is strong evidence that discards and offal provide an important food supply for a variety of species of scavenging seabirds (Furness *et al.*, 1992; Blaber *et al.*, 1995; Thompson and Riddy, 1995; Garthe *et al.*, 1996) and this feeding opportunity affects not only distributions of seabirds (Ryan and Moloney, 1988; Arcos and Oro, 1996; Freeman, 1997) but also their body condition (Hüppop and Wurm, 2000), breeding success (Oro *et al.*, 1995; Oro *et al.*, 1996a), contaminant accumulation (Arcos *et al.*, 2002), interspecific interactions (Heubeck *et al.*, 1999; Oro and Furness, 2002), population size (Oro *et al.*, 1996b; Chapdelaine and Rail, 1997) and demography (Furness, 2003). In the pSEIS and Ecosystem Considerations, these issues are discussed and it is evident that effects are being assessed by 'expert guesswork' rather than from a basis of scientific knowledge.

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

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

<p><b>APA Activity</b></p>	<p><i>With the exception of the reference to fur seals in the BS/AI report, this Condition and Action Plan response for the BS/AI and GOA are identical.</i></p> <p><i>Within 12 months, APA will provide to the certification body a comprehensive report documenting research completed since summer 2002 on the effects of pollock fishing, if any, on SSL critical habitat as well as discussion of ongoing research projects relating to the impact of pollock fishing, if any, on foraging sea lions. AFSC informs APA that the agency conducted research in 2004 (the so-called Chiniak study) on this specific issue. The report will include also discussion of research results reported in 2004 indicating that localized depletion of Pacific cod was not evident in an AFSC experiment that included control areas and areas in which cod trawling occurred.</i></p> <p><i>APA believes that it would be beneficial also to provide to the certifier an update on research on competing, and perhaps more salient, hypotheses relating to SSL populations, including effects of “regime shifts” and killer whale predation on SSL populations. APA will also provide a written review prior to the first annual audit by the certifier of the effects, if any, of the de minimus amount of fish discarded by GOA pollock fishing vessels on scavenging seabirds. AFSC reports that Dr. Ann Edwards, a post doctoral fellow from the National Research Council, will be conducting relevant research on this topic. APA will provide to the certifier progress reports prepared by Dr. Edwards as well as the project’s findings. Additionally, APA is participating in a seabird study that will include an inquiry into seabird foraging activities and potential interactions with pollock catcher/processor vessels. This study is partially funded through a grant by NMFS. APA will present the results of this NMFS-funded research program to the certifier prior to the first annual audit.</i></p>
<p><b>Conclusion of Surveillance Report 1</b></p>	<p>The first part of this condition, providing an update on ongoing research re possible impacts of pollock fishing on SSL critical habitat, has been reasonably met. Current research on the possible effects of pollock fishing on SSL prey should provide valuable guidance on the likelihood of negative impacts and serve to improve future studies of possible impacts. A review of this issue (among others) by Professor I. Boyd will be presented in the second surveillance report to complement the work presented above. Other conditions are also relevant to this issue (Conditions 6 and 10) in terms of outcomes following from such research and this part of the Condition is therefore considered to be closed</p> <p>The second part of this condition refers to Indicator 3.1, to consider the impacts of gear loss. Indicator 3.1 is Condition 11 of the BS/AI Pollock Fishery Surveillance Report. The relevant conclusion of this was that the requirements of this condition have not yet been fully met. Accordingly, it is required that for Condition 11.1, APA carry out a systematic survey of members to determine incidents of gear loss and garbage disposal which could include plastic waste, a summary report of the results of this survey should be provided. A supporting report from the NMFS Observer programme should also be requested. These two reports should be presented to the assessment team prior to the second surveillance audit.</p> <p>For the third part of the condition, current research on the importance of discards in the diet of seabirds should provide a basis for making decisions about probably impacts on some seabird species. The research by Dr Edwards addresses several of the concerns of the initial assessment with respect to the impact of discards on seabirds. This work is due for completion in 2006 and will be discussed in full in the second surveillance report. Any further requirements in this regard will then be determined as part of the second surveillance report.</p>
<p><b>Conclusion of Surveillance Report 2</b></p>	<p>As indicated in the first surveillance report, the first condition has been reasonably met. This has been further enhanced with Professor Boyd’s reports on the possible impacts of the pollock fishery on regional abundance of SSL food and the consequences of such effects on SSL recovery.</p> <p>A review of Dr. Edward’s findings will be important to our evaluation of the extent to which the third outstanding condition has been met.</p> <p>Compliance with this condition remains on-target and the condition is expected to be closed within the term of the present MSC certification.</p>

<p><b>Conclusion of Surveillance Report 3</b></p>	<p>As indicated in the previous surveillance report, part 1 of this Condition has been reasonably met and can be consider closed, although ongoing research and new findings will continued to be reviewed by the surveillance team. Part 2 of the Condition remains open (see Condition 11), as does Condition 3 pending the surveillance team’s review of the published results of the extensive research on the effects of offal discharge on seabirds.</p> <p>Progress in meeting this condition is satisfactory, albeit the pace at which this research is becoming available for detailed review could be accelerated.</p>
<p><b>APA Progress Report</b></p>	<p>The Alaska Fishery Science Center (AFSC) is currently increasing its research emphasis on seabird fishery interactions, and incorporating seabirds into ecosystems models being developed for the Bering Sea and Gulf of Alaska. The AFSC is engaged in a series of studies designed to gain a better understanding of seabird interactions with the Alaska groundfish trawl fisheries and the factors that affect those interactions. This is an important issue in part due to seabird mortalities associated with those fisheries, including known incidental takes of Laysan albatross (<i>Phoebastria immutabilis</i>). In 2003 the Alaska groundfish trawl fisheries were included in the short-tailed albatross (<i>P. albatrus</i>) Biological Opinion due to the use of Laysan albatross as a bycatch proxy for short-tailed albatross in conjunction with the sighting of these seabirds around trawl vessels as they fished and processed catch. A summary of seabird and fishery interactions research is at: <a href="http://www.afsc.noaa.gov/refm/reem/Seabirds/Default.php">www.afsc.noaa.gov/refm/reem/Seabirds/Default.php</a></p> <p>The potential for spatial and temporal overlap of seabirds and the groundfish trawl fishery in Alaska waters is influenced in part by the attractiveness of the vessels to the birds. Seabirds are attracted to vessels as a source of food via the fishery discards. The composition of discharged material from Alaska groundfish trawl vessels varies from whole discarded fish to heads, offal macerated to 1 cm chunks, and watery slurry containing little fish matter, depending on the processing capabilities on board.</p> <p>A pilot study was conducted to measure the relative attractiveness of discard type to seabirds. This study relied on volunteer efforts from observers in the AFSC North Pacific Groundfish Observer Program to count the numbers of seabirds feeding within discharge plumes alongside trawl vessels. Observers recorded the numbers of birds, discharge type, and concurrent vessel activity. The study was designed to perform on multiple platforms with multiple observers and require little time or specific bird knowledge. The results suggest that the season during which observations were made and the discard type had the greatest influence on the number of birds feeding in plumes. The fact that the number and type of seabird present in the marine system varies due to migratory patterns or breeding phenology may be the most important factor in determining how many seabirds are feeding in discharge plumes, and therefore in the vicinity of trawl gear and exposed to the risk of mortality.</p>
<p><b>Observations</b></p>	<p>Over the past several years, there has been a growing effort to understand and mitigate the effects of discards and waste discharges from the pollock fishery on seabirds. These efforts have involved researchers for both NOAA and the USFWS and staff of the fisheries Observer Program. Satellite tracking data indicate relatively low overlap between the foraging distributions of Black-footed and Laysan albatrosses and the pollock fishery. Zador <i>et al.</i> (2008) examined the spatial and temporal overlap between the short-tailed albatross, <i>Phoebastria albatrus</i>, an endangered species, and the Alaskan pollock trawl fleet using seabird sightings and distance to the 1000 m isobath as proxies for seabird densities. Although the results were sensitive to the method used to determine the seasonal distribution of short-tailed albatross, this analysis does point to the merit of such studies in potentially reducing spatial and temporal overlap with the fishery. Research conducted by Fisheries Observers in 2004-2006 indicates that northern Fulmars and shearwaters were most often killed in trawl fisheries. Given best estimates of population size, mortalities caused by the Pollock fishery are not at a level that would negatively affect those species. There have also been pilot studies on the relative attractiveness of the discharged material is to assign relative risk to seabirds among trawl vessels (Zador and Fitzgerald 2008).</p> <p>The assessment team has now reviewed a paper by Edwards <i>et al.</i> (to be submitted) on changes between 1996 and 2005 in regulatory and economic factors that affected discharge from at-sea</p>

	<p>and shoreside processors of the BSAI midwater trawl fishery. They found that discharge rates were most strongly affected by whether processing occurred on land or sea, and by the proportion of offal made into fishmeal. Over the period of the study, discharge rates were reduced five times more by improved utilization rates (proportion of the retained catch of pollock that was made into primary or ancillary products) than by improved retention rates of pollock. Estimated discharge from at-sea processors during summer potentially provided enough energy to support the daily requirements of approximately one third of the estimated 18 million surface scavenging seabirds in the eastern Bering Sea. Additional work is being done to calculate what fraction of the seabird population makes use this source of food and what fraction of the discharge is actually used by seabirds compared to that used by meso-pelagic and benthic scavengers, respectively.</p>
<p><b>Conclusion</b></p>	<p>The work of Zador <i>et al</i> (2008) and Zador and Fitzgerald (2008), together with the Edwards work that is in final stages of preparation for submission to the peer-reviewed literature, satisfy the condition to evaluate the effect of discharges from the pollock fishery on seabirds. Increased research on the extent of seabird bycatch, the low, seasonal overlap between short-tailed albatross and the pollock trawl fishery, and measures to mitigate fishery effects on seabirds all contribute toward satisfying this condition.</p> <p>On the basis of the above commentary, and with particular focus on part 3 of this Condition which required that a thorough written review of discarding from pollock fishing as a food supply affecting scavenging seabirds is provided, the score associated with the Performance Indicator 1.2.1 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>● The effects of trawling on benthic and pelagic habitats have been assessed and the results presented in documents available to stakeholders.</li> <li>● Particular attention is given to vulnerable habitats such as those inhabited by corals and those providing essential fish habitat.</li> <li>● Impacts of fishing on food-fish abundance and distribution have been considered and presented in documents available to stakeholders.</li> <li>● Effects of discards and waste discharges have been considered and presented in documents available to stakeholders.</li> <li>● Gear loss has been reviewed and impacts on habitats considered and presented in documents available to stakeholders.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>● Important adverse effects of trawling on benthic and pelagic habitats are measured at intervals on a programmatic basis.</li> <li>● Particular attention is given to effects of trawling on vulnerable habitats such as those inhabited by corals, and essential fish habitat or fish spawning areas.</li> <li>● Impacts of fishing on food-fish abundance and distribution are measured, in particular as they affect availability of food for consumers such as endangered, threatened, protected, or icon species.</li> <li>● Effects of discards and waste discharges on habitats are measured at intervals on a programmatic basis.</li> <li>● Quantities of gear lost are recorded, and the impact of lost gear on habitats is measured.</li> <li>● This information is presented in documents that are made available to stakeholders.</li> <li>● Responsive management changes occur as a direct result of assessment findings.</li> </ul> <p>The score allocated to this Performance Indicator is now raised to 85. This condition has now been closed. Performance Indicator 3.1 has also been satisfied, see Condition 11 below.</p>

<b>6</b>	<p><b>Condition of Certification 6.</b> Research is carried out to allow impacts of the fishery on the biodiversity and structure of invertebrate and vertebrate communities in relevant habitats to be identified, measured, and understood in terms of functional relationships.</p>
<b>Assessed Activity</b>	<p>This Condition relates principally to Indicator 1.2.3. Indicator 3.2 also relates in part.</p> <p>The intention of this performance indicator is to evaluate the extent to which a body of knowledge exists to permit the impacts of the fishery to be identified, and discriminated from impacts due to other factors such as natural variations in environmental conditions. This involves both a research plan and an implementation strategy.</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on habitats.</li> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.</li> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.</li> <li>• There is a coordinated research plan to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.</li> <li>• The results of research findings are made directly available to management authorities and the public on a programmatic basis.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on habitats.</li> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.</li> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.</li> <li>• A coordinated research plan is being developed to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.</li> <li>• As research proceeds and new information is learned, it is made available to management authorities and the public in a timely manner.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <p>Research into the effects of the fishery on habitats, animal communities, populations, food webs, and ecological functional relationships is carried out in sporadic projects with little strategic planning or coordination. Results therefore provide only a weak basis for adjusting fishery management to reduce impacts.</p> <p><b>SCORE 79</b></p> <p>There is a very considerable research effort into many aspects of the ecology of the eastern Bering Sea. This high quality research is internationally respected as of a very high quality, and much of the research is directly relevant to the position of pollock within the ecosystem and to interactions between the pollock fishery and ecosystem processes. Some aspects of Pacific ecosystem research are not only directly relevant but also outstanding science (for example the Resource Ecology and Ecosystem Modelling Task (REEM) located within REFM at NMFS AFSC, which provides a continuing research program aimed at understanding mechanisms through which the Alaska fisheries may cause adverse effects on vertebrate and</p>

	<p>invertebrate biodiversity, community structure and population dynamics.</p> <p>Budgeting for research into key questions concerning the effects of the pollock fishery on the ecosystem seems weaker than might be expected knowing that a large fishery is occurring in and around the critical habitats occupied by an endangered species. While there is a research strategy, topics of highest importance in fishery-ecosystem impacts do not appear to receive adequate attention. Testing of key hypotheses have not been aggressively pursued in detail. For example there are many leading questions that continue to be unanswered such as, functional relationship between Steller sea lion foraging and pollock prey densities; extent to which northern fur seal mortality rate is increased by entanglement; the hypothesis that removal of pollock from SSLCH has no effect on food availability to SSL.</p> <p>The following are relevant quotations from the Supplement to the Endangered Species Act – Section 7 Consultation Biological Opinion and Incidental Take Statement of October 2001 (June 2003: pp 57-58).</p> <p>“The analyses in the preceding sections of this biological opinion forms the basis for conclusions as to whether the proposed action, the ongoing fisheries for Pacific cod, Atka mackerel, and Pollock in the BSAI and GOA as modified by amendments 61/61 and 70/70 satisfy the standards of the ESA Section 7(a)(2).”</p> <p>“The supplement further explores the rationale of the 2001 Biop, the telemetry information and the performance of the fisheries in relation to the requirement in order to remove jeopardy and adverse modification found in the FMP Biop. On the basis of this information and the analysis (2001 Biop and the supplement), NOAA Fisheries draws its conclusions about the effects of the pollock, Pacific cod, and Atka mackerel fisheries on the survival and recovery of the two listed populations of Steller sea lions.”</p> <p>“In this section NOAA Fisheries must determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed action, the environmental baseline, and cumulative effects. The information available to NOAA Fisheries is both quantitative and qualitative. For Steller sea lions, although significant research has been funded over the past few years and new information is being developed on the habitat requirements of the species, as well as various reviews (e.g., Bowen <i>et al.</i>, 2001; NRC 2003) the cause of the current decline of the species is still unknown. NOAA Fisheries expects that over the next 3-5 years a significant amount of new information will be available for future decision making, however, much of the available data today is based on the professional judgment of knowledgeable scientists.”</p> <p>“After reviewing the current status of the endangered western population of Steller sea lions, the environmental baseline for the action area, the proposed action for Alaska Groundfish in the Bering Sea and Aleutian Islands and Gulf of Alaska, and the cumulative effects, it . . . is not likely to jeopardize the continued existence of the western population of Steller sea lions.”</p> <p>The enormous increase in spending on SSL research for the past 2 years have occurred as a result of political negotiations rather than a sensible long-term research strategy. The fact that the set of RPA regulations have been altered on an almost annual basis means that it is very difficult to look at data sets for potentially impacted wildlife in relation to the management of the fishery, since impacts on population trajectories will likely be occurring over decadal scales.</p> <p>Although many aspects of this Indicator exceed the 80 guidepost, these weaknesses in focus of research on key issues relating to the impact of pollock fishing lead us to score this Indicator below the 80 threshold.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, research must be implemented to describe:</p> <ol style="list-style-type: none"> <li>1. Relationships between Steller sea lion and fur seal foraging behaviour (especially as this relates to foraging economics or sea lion/fur seal foraging distribution) and</li> </ol>
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	<p>pollock prey abundance at the regional scale related to stock size and stock geographical distribution;</p> <ol style="list-style-type: none"><li data-bbox="507 255 1465 376">2. Relationships between Steller sea lion and fur seal foraging behaviour (especially as this relates to foraging economics or sea lion/fur seal foraging distribution) and pollock prey abundance at the local scale related to putative fish school disruption in localized areas caused by trawling;</li><li data-bbox="507 378 1437 499">3. Plans for these research projects will be sent to the SCS team for review, and then initiated no later than the following calendar year. Where research leads to new information relevant to management, appropriate changes in management will be required.</li></ol>
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<b>APA Activity</b>	<p><i>This Condition and Action Plan response are substantially the same for the BS/AI and GOA pollock fisheries. APA will provide a thorough written report to the certification body within 6 months of the issuance of the certificate on the status of research relating to SSL foraging behavior and pollock prey abundance at the regional and local scales. While the Condition calls for research to be “implemented,” APA believes that the accounting of NMFS’ research program provided under APA’s responses to other Conditions will satisfy this Condition. APA will include in its report an assessment of work on this issue funded by the FY 2005 appropriations bill for NOAA, which was enacted in late November 2004.</i></p> <p><i>APA proposes that the certifier focus on this issue at the first annual audit. APA will request a meeting with relevant AFSC staff, the certifier and APA so that the certifier can understand fully the agency’s program with regard to this issue.</i></p> <p><i>Tasks performed under other Conditions will be coordinated with the response to Condition #6.</i></p>
<b>Conclusion of Surveillance Report 1</b>	Progress to date is satisfactory.
<b>Conclusion of Surveillance Report 2</b>	<p>As indicated in the first surveillance report, the first part of this condition has been reasonably met. This has been further enhanced with Professor Boyd’s reports on the possible impacts of the pollock fishery on regional abundance of SSL food and the consequences of such effects on SSL recovery.</p> <p>Condition 11 (Indicator 3.1) is considered later in this report.</p> <p>A review of Dr. Edward’s findings will be important to our evaluation of the extent to which the third outstanding condition has been met, i.e., whether appropriate changes in management will be required.</p> <p>Compliance with this condition remains on-target and the condition is expected to be closed within the term of the present MSC certification.</p>
<b>Conclusion of Surveillance Report 3</b>	The open ended nature of this Condition means that despite all that has been done to address deficiencies, Conditions 1 and 2 remain open. Nevertheless, progress continues to be satisfactory. Condition 3.1 remains open (see Condition 11).
<b>APA Progress Report</b>	<p>The Alaska Ecosystems Program (AEP) at the National Marine Mammal Laboratory (NMML) conducts research on Steller Sea Lion (SSL) and Northern Fur Seal (NFS) foraging and the potential for impacts on their habitat from commercial fishing. A listing of recent research activities and publications of NMML that concern SSLs is at: <a href="http://www.afsc.noaa.gov/nmml/species/species_steller.php">www.afsc.noaa.gov/nmml/species/species_steller.php</a>. A description of field and laboratory activities to support SSL research during 2008 is provided at: <a href="http://www.afsc.noaa.gov/Quarterly/jas2008/divrptsNMML1.htm">www.afsc.noaa.gov/Quarterly/jas2008/divrptsNMML1.htm</a>.</p> <p>The primary field activity associated with monitoring SSLs in Alaska was an aerial survey of more than 350 terrestrial rookery and haul-out sites, conducted 7 June–6 July, from Dixon Entrance in Southeast Alaska to Attu Island at the western end of the Aleutian Islands. The objective of the survey was to photograph and count adult and juvenile SSLs for population status and trend determination. The survey was conducted using a deHavilland Twin Otter aircraft (Fritz <i>et al.</i> 2008).</p> <p>In addition, three projects were conducted to advance knowledge of SSL vital rates. The first was a pup capture, branding, and condition cruise aboard the US Fish and Wildlife Service research vessel <i>Tiglax</i>, 24 June–7 July 2008, between Dutch Harbor and Homer, Alaska. During the project, 178 pups were hot-branded with individual marks at Sugarloaf Island (5 July; N = 93) and at Marmot Island (6 July at Beach 4; N = 85). Each pup was also weighed, measured, and sexed, and skin and blood samples were taken from a subsample as part of SSL stock-structure investigations and foraging ecology and health studies projects. Approximately 50 pups were also weighed, measured, and sexed at each of six rookeries in the eastern</p>

	<p>Aleutian Islands, western Gulf of Alaska, and central Gulf of Alaska (Akutan/Cape Morgan, Sea Lion Rocks, Clubbing Rocks, Pinnacle Rock, Jude, and Chowiet). Skin and blood samples were taken from approximately 25 of these pups. Scat samples were also collected at rookeries as part of a SSL and NFS food habits research project.</p> <p>An effort to locate branded sea lions was undertaken from the chartered research vessel <i>Norseman</i>, 17 June–11 July 2008, between Dutch Harbor and Seward, Alaska. SSLs were observed at more than 100 rookery and haul-out sites between the eastern Aleutian Islands and Prince William Sound. A total of 207 individual branded sea lions were observed and positively identified; 160 were branded as pups within the range of the endangered western population (west of 144°W through Alaska and Russia), 14 were branded as pups within the range of the threatened eastern population (east of 144°W through Southeast Alaska, British Columbia, Washington, Oregon, and California), and 33 were branded as juveniles captured on land or at sea away from their natal rookery. In addition, particular attention was paid to the observation of 72 marked adult females to determine whether they had given birth in 2008 or in a previous year (if they were observed nursing a juvenile). Cruise participants assisted with branding operations at Sugarloaf and returned to the site the following day to monitor post-disturbance recovery at the rookery.</p> <p>A second effort to locate branded sea lions was undertaken by teams of observers based at field camps on Marmot and Ugamak Islands during late May through early August 2008. A team on the south end of marmot Island from 28 May to 28 July identified 138 individual, branded animals; 28 of these animals were adult females, which were also monitored for reproductive activity. A team at the north end of Marmot Island from 28 May to 28 July identified 110 individual, branded animals, 16 of which were adult females. A third team on Ugamak Island from 2 June to 31 July identified 141 individual, branded animals (including 42 adult females) for survival analyses. In addition to looking for branded animals, animal counts were made for each haul-out and rookery beach as frequently as weather permitted and behaviour scans were conducted. Personnel on Marmot Island also monitored the recovery of the rookery at Beach 4 following the research disturbance associated with pup branding on 6 July.</p> <p>A survey of Steller sea lions was also conducted in the western Bering Sea, in the Commander Islands and the Kamchatka Peninsula, on the <i>R/V Georg Steller</i> during June 28 to July 14, 2008 (Burkanov <i>et al.</i> 2009). All 35 known SSL sites were visited once or twice during the survey. At most sites sea lions were counted from land on locations above the animals. The approximate age and sex of hauled out animals was recorded as well. A total of 1,353 non-pups and 366 pups were counted. Compared to the survey in 2004, the total number on trend sites slightly declined from 1,707 to 1,679, or 1.6 percent. The number of pups during this time slightly increased (from 322 to 326) but the number of non-pups decreased from 1,385 to 1,353 individuals. The abundance of Steller sea lions in the region has stayed relatively stable at a low level. In contrast with those areas surveyed in 2008, the abundance of Steller sea lions in the Kuril Islands continued to grow. In 2007 the total number compared with 2005 counts increased from 8,597 to 10,182 individuals (15.6 percent). Surveys conducted in Sakhalin and northern part the Sea of Okhotsk in 2006 showed lower numbers but changes in these areas weren't related to a real decline but redistribution (Sakhalin) and undercount (Yamsky Islands). Estimated total current abundance of Steller sea lions in Russian waters is about 25,000 individuals including newly born pups.</p>
<b>Observations</b>	<p>Over the past four years or so, a great deal has been learned about the seasonal foraging ecology, diets, and the regional and local scale distribution of Steller sea lions in the BSAI. Continuing research has also been conducted on trends in abundance and new research on vital rates has become available that sheds light on the mechanisms underlying the demography of Steller sea lions. These and other studies have been critically reviewed with respect to how the pollock fishery might impact sea lions in the 2006 Boyd reports, the revised Steller sea lion recovery plan (NMFS 2008), and Bowen <i>et al.</i> (2007) and SAFE reports. Available sea lion data, extensive data on fish and invertebrate predators and prey, and information on the pollock fishery have been used to model the ecosystem effects of fishing on dependent species (e.g., Aydin <i>et al.</i> 2007). Although not definitive in its conclusions, this modelling work is state-of-the-art and in many ways is on the leading edge of such research that attempts to evaluate the effects of fishing and environment change on ecosystem structure and functioning.</p>

<p><b>Conclusion</b></p>	<p>Based on the continuing and extensive efforts to understand the effect of the pollock fishery on Seller sea lions, and in reference to the original 80 Scoring Guideposts which require a continuing research programme to be in place, the surveillance team is of the opinion that the condition has been reasonably met. On the basis of the above commentary the score associated with the Performance Indicator 1.2.3 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on habitats.</li> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.</li> <li>• There is a continuing research program aimed at understanding mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.</li> <li>• A coordinated research plan is being developed to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.</li> <li>• As research proceeds and new information is learned, it is made available to management authorities and the public in a timely manner.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on habitats.</li> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on invertebrate biodiversity, community structure and population dynamics.</li> <li>• There is detailed information on mechanisms through which the fishery causes adverse effects on vertebrate biodiversity, community structure and population dynamics.</li> <li>• There is a coordinated research plan to understand fishery impacts on habitats, biodiversity, structure of invertebrate communities, food webs, predator-prey dynamics and population dynamics.</li> <li>• The results of research findings are made directly available to management authorities and the public on a programmatic basis.</li> </ul> <p>The score allocated to this Performance Indicator is now raised to 85, and this Condition closed. Note that Performance Indicator 3.1 will be discussed below under Condition 11.</p>
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7	<p><b>Condition of Certification 7.</b> Data on spatial and temporal variations in abundances of animal populations and communities have been synthesized into a set of internally consistent explanatory hypotheses that can provide the basis for making predictions about future system states and consequences of management actions.</p>
Assessed Activity	<p>The intention of this performance indicator is to evaluate how well data collected under 1.3.1 and 1.3.2 have been compiled and reviewed to enable intelligent choices among management actions.</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is sufficient understanding of the information collected on functional relationships between fisheries actions and responses of animal populations and communities such that management decisions can be made to mitigate effects from fishing.</li> <li>• Information on changes in the status of animal populations and communities is provided in a timely fashion such that management decisions can be made, where appropriate, to mitigate the effects of fishing.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• At a minimum, estimates of empirical relationships between fisheries actions and responses of animal populations and communities have been made and provided to management for consideration in reducing the effects of fishing on animal species and communities and for informing research decisions.</li> <li>• Where it seems to be appropriate, management decisions respond to changes in the status of animal populations and communities, on a precautionary basis.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <p>For species that have been identified as effected by fishing, there is insufficient knowledge to estimate spatial and temporal variations in abundances of animal populations and communities adequate to permit management decisions to be made in response to changes in the status of animal populations and communities.</p> <p><b>SCORE 75</b></p> <p>Research on the functional relationships between predators and pollock abundance and/or distribution has largely failed to determine whether or not predator populations are being affected by the pollock fishery. Too little is known to determine whether changes in abundances of predatory fish such as arrowtooth flounder or of potential replacement species for planktivorous (smaller) pollock (e.g. jellyfish) are likely to be due to reductions in pollock biomass consequent on fishing.</p> <p>Also, annual alterations in RPAs related to reducing impacts of the fishery on SSLCH appear to be rather arbitrary and based on inadequate scientific understanding to provide clear justification for actions taken. Nor have these measures been demonstrated to indeed mitigate putative impacts of the fishery on SSL. It is anticipated that this will change at the completion of the PSEIS if the management follows through on the information compiled and the results of the analyses.</p> <p>The score assigned is primarily based on the fact that little is known of the relationships between pollock harvest and arrowtooth flounder and jellyfish population trends, but also on the fact that the RPAs for the GOA fishery have been rather unsuccessful in reducing the very high proportion of pollock harvest taken from within SSLCH (see Figure 2.1(b)), and the fact that the GOA TAC has tended to be set at the highest level permitted by the ABC in recent years when the stock has been decreasing to all time low levels, despite the fact that the impact of a stock so greatly reduced in abundance on the wider ecosystem (and especially on SSL) is largely a matter of speculation. In the latter context we recognize that several risk-aversion measures have been put in place for the 2002 and 2003 ABC setting process that have reduced</p>

	<p>the ABC for pollock and thus the GOA TACs.</p> <p>According to the 2003 SAFE document for GOA pollock, “The elements of risk-aversion in this recommendation relative to using the point estimate of the model and the maximum permissible F-ABC are the following: 1) fixing trawl catch-ability at 1.0, 2) assuming an average 1999 year class instead of the model estimate, 3) not adjusting the 2002 Shelikof Strait survey biomass estimate despite evidence that the fraction of the stock spawning in Shelikof Strait was lower in 2002, 4) applying a more conservative harvest rate than the maximum permissible F-ABC. Collectively these risk-averse elements reduce the recommended ABC to less than 40% of the model point estimate.” Therefore it is clear that the ABCs have been set conservatively in response to uncertainties in the GOA stock assessment data (which seem to have increased in recent years with the decline in stock biomass).</p> <p>However, it may be useful to note that where studies have investigated responses of top predators to reductions in their food fish abundance, decreases of 70-80% in food fish stocks (i.e. approximately the situation currently existing with pollock in the GOA), have led to some dramatic reductions in predator densities or breeding performance. However, responses may vary considerably among species as a function of their vulnerability resulting from aspects of the individual species’ ecology. For example, black-legged kittiwakes, parasitic jaegers and terns at Shetland, U.K., showed almost total breeding failure in years when sandeel abundance was around 20% of ‘normal’ (Phillips <i>et al.</i>, 1996; Furness and Tasker, 2000) but the breeding of some other seabird species was almost unaffected as they were able to compensate by behavioural means. Similarly, in the case of the decline in abundance of capelin in the Barents Sea in the 1980-90s a population crash affected common murre as a result of winter starvation (Vader <i>et al.</i>, 1990; Barrett and Krasnov, 1996) but did not affect some other species.</p> <p>These examples suggest that a 70-80% decline in pollock abundance in the GOA may be expected to affect foraging top predators that are sensitive to food availability. Although the sensitivity of the Steller sea lion to prey field reduction is not known, the fact that Steller sea lion has an energetically expensive mode of foraging, and carries little fat reserves, would tend to suggest that sea lions will be more sensitive to reduced prey availability than some other species.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, the fishery must provide the SCS team with information on ecosystem modelling being carried out to investigate whether increases in jellyfish or arrowtooth flounder are likely to be due to reductions in pollock biomass consequent to fishing.</p> <p>Concerns regarding the relationship between the pollock fisheries and SSLs are dealt with under Indicator 2.3.1.</p>
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<b>APA Activity</b>	<i>Within six months of the issuance of the GOA pollock certificate APA will meet with the authors of the GOA food-web model and request that a sensitivity analysis be carried out whereby perturbations to the pollock biomass, similar in scale to historic fishery removals, are analyzed with regard to their possible effects on arrowtooth and jellyfish biomass in the GOA. Prior to the first annual audit, APA will provide the certification body with a summary of the analyses conducted by NMFS. If the certification body determines that the information does not adequately satisfy the condition, APA will within three months of the annual surveillance provide a revised action plan to the certification body outlining how and when the condition will be fully met.</i>
<b>Conclusion of Surveillance Report 1</b>	Progress to date is considered satisfactory. Modelling aimed at addressing the requirements of this condition is underway and some results are available. Further progress with this Condition will be evaluated at the second surveillance audit, at which time, subject to further progress and ongoing commitments, the Condition may be closed.
<b>Conclusion of Surveillance Report 2</b>	Progress on this condition has been very satisfactory. The deficiencies in performance for this indicator have been significantly improved, information on ecosystem modelling has been conducted and the results demonstrated. Investigations have been undertaken into whether increases in jellyfish or arrowtooth flounder are likely to be due to reductions in pollock biomass consequent to fishing. For completeness the assessment team would like the output model to include an evaluation of the trophic linkages between GOA species and jellyfish as had been the intention in 2006. This will be reviewed in the 2008 surveillance audit and the condition is expected to be closed within the term of the present MSC certification.
<b>Conclusion of Surveillance Report 3</b>	The first part of this Condition has been met. Progress on the remaining condition (PI 3.1) is satisfactory (see Condition 11).
<b>Observations</b>	<p>Although the first part of this condition was met last year, it is noted that the proposed integrated ecosystem research projects being funded by the North Pacific Research Board will likely shed additional light on the biology of northern fur seal in the GOA.</p> <p>The second part of this Condition has been closed (i.e. Performance Indicator 3.1) under Condition 11 below.</p>
<b>Conclusion</b>	<p>The surveillance team is satisfied that the remaining part of this Condition has been met (see Condition 11 below) and so, with the improvements in ecosystem modelling the score associated with the Performance Indicators 1.3.1 and 1.3.2 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• At a minimum, estimates of empirical relationships between fisheries actions and responses of animal populations and communities have been made and provided to management for consideration in reducing the effects of fishing on animal species and communities and for informing research decisions.</li> <li>• Where it seems to be appropriate, management decisions respond to changes in the status of animal populations and communities, on a precautionary basis.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• There is sufficient understanding of the information collected on functional relationships between fisheries actions and responses of animal populations and communities such that management decisions can be made to mitigate effects from fishing.</li> <li>• Information on changes in the status of animal populations and communities is provided in a timely fashion such that management decisions can be made, where appropriate, to mitigate the effects of fishing.</li> </ul> <p>The score allocated to this Performance Indicator is now raised to 85, and this Condition closed.</p>

8	<p><b>Condition of Certification 8.</b> The fishery is conducted in a manner, which does not have unacceptable impacts on biological diversity at the genetic, species or population level of endangered, threatened or protected species.</p>
Assessed Activity	<p>This Condition relates principally to Indicator 2.1.</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>An ecological risk assessment has been conducted, based on knowledge of functional relationships, to determine the potential impacts of the fishery on the genetic, species and population level biodiversity endangered, threatened or protected species. Fishery management is constrained to minimize impacts on the basis of this risk assessment. Impacts are held below levels that would be unacceptable.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>An assessment has been conducted to estimate the potential impacts of the fishery on the genetic, species and population level biodiversity for endangered, threatened or protected species. Fisheries management has shown itself to be responsive to this risk assessment and attempts to minimize impacts.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>There is inadequate knowledge of endangered, threatened or protected species such that important impacts of the fishery on their biodiversity cannot be identified and it is impossible to adjust management to confidently expect reductions in these impacts.</li> </ul> <p><b>SCORE 79</b></p> <p>According to stakeholder reports submitted to the evaluation team (Bernstein <i>et al.</i>, 2002), 'bycatch reduction and monitoring programs are effective. But bycatch reporting could be improved'. However, the main reason why the GoA pollock fisheries fell below the 80 guidepost score derives from the fact that the impact of the fisheries on protected pollock predators is largely unknown. In the presence of this uncertainty, given the general lack of knowledge as to whether pollock fishing affects populations of pollock predators (especially Steller sea lions, harbor seals, northern fur seals) a precautionary approach to fishery management would be expected. Although closure of the AI fishery was a precautionary response to possible impacts on SSL, there is little evidence of precaution to avoid possible impacts on fur seals or harbor seals despite some evidence suggesting an impact. RPAs have been rather ineffective in reducing harvest of pollock from SSLCH, and there does not appear to be a systematic approach to understanding or mitigating effects on other protected species such as fur seals or harbor seals. In the absence of a better understanding about the effects of the fishery on these species, a more precautionary approach to constraining harvest from critical areas for predators would seem warranted. Setting TAC below the ABC is one way to be precautionary, but empirical evidence from these fisheries is that the TAC is only set significantly below the ABC when the stock size is exceptionally large (so that precaution is not a key issue). Another way to be precautionary would be to set ABCs using an approach that better incorporates ecosystem considerations.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, the fishery must:</p> <ol style="list-style-type: none"> <li>Adjust management as described in the Conditions under Indicator 1.1.</li> <li>Improve published reports by management agency on bycatch taken by the pollock fishery by structuring the reports to show data by species, vessel type, location of hauls, time of hauls, relationship to SSLCH, and by quarters, while protecting the rights afforded fishers under the law to protect against the release of certain proprietary information.</li> </ol>
APA Activity	<p><i>This Indicator and Condition have identical wording to the BS/AI report. The Action Plan response for the GOA has been amended to reflect the differences in the two fisheries. Item #1 of this Condition is discussed in Condition #4 of the Action Plan. Item #2 above contains an apparent contradiction by requesting that NMFS publish information on bycatch in the pollock fishery on a vessel-by-vessel basis while noting that such action would violate confidentiality</i></p>

	<p><i>rights provided to fishers under the Magnuson-Stevens Act. The reports correctly note the de minimis discard levels in the BS/AI pollock fishery and note that the agency maintains an excellent pollock catch data programs as part of NOAA Fisheries' precautionary approach to minimizing the impacts of fishing on the environment.</i></p> <p><i>APA will request that NMFS prepare a report within 12 months that meets the issues raised in provision #2 of Condition #8. APA will provide the report to the certification body. APA will request a meeting with NMFS and the certification body to determine the utility of such report, and if it is found to be useful, determine the feasibility of the agency preparing such a report on an annual basis.</i></p>
<p><b>Conclusion of Surveillance Report 1</b></p>	<p>Progress on the first part of this condition is reported under comments on Conditions 1 to 4 and so this part of Condition 8 is considered elsewhere, to avoid unnecessary duplication.</p> <p>There is evidence of progress on the bycatch reporting part of this Condition, but the web-based system for public access to bycatch data, being developed by Seastate and NMFS, is not yet fully operational. It is understood that a beta-version of the website page and associated software has been sent to industry representatives and Oceana representatives for their preliminary use and evaluation. Following comment from these trial users, public access is to be provided. This system will be reviewed and reported on in the second surveillance report in relation to the requirements of this Condition.</p>
<p><b>Conclusion of Surveillance Report 2</b></p>	<p>Progress on the first part of this condition is reported under comments on Conditions 1 to 4 and so this part of Condition 8 is considered elsewhere, to avoid unnecessary duplication.</p> <p>Compliance with the second part of this condition has been met.</p> <p>Where a Performance Indicator is addressed by multiple conditions, a notional score of 80 will be required and applied to those elements of the Performance Indicator addressed by a condition being closed. The final score for the Performance Indicator will then be determined when the last relevant condition is closed. These Indicators will therefore be subject to total or partial re-scoring following confirmation of the requirements above.</p>
<p><b>Conclusion of Surveillance Report 3</b></p>	<p>With the closure of Conditions 1 – 4 the first part of this Condition has now been met. There has been an evaluation of risk to protected species, and the fishery has shown itself to be highly responsive to the results of those evaluations.</p> <p>Part 2 of the Condition was considered to have been met last year. However, we note that careful and timely monitoring of salmon bycatch needs to continue throughout the rest of 2008 and beyond, and the fleet needs to continue to take near-real-time actions to avoid bycatches of salmon. The situation will be monitored over the 'B' fishery and the issue will be re-visited at the next surveillance audit.</p> <p>On the basis of the above commentary the score associated with the Performance Indicator 2.1 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• An assessment has been conducted to estimate the potential impacts of the fishery on the genetic, species and population level biodiversity for endangered, threatened or protected species. Fisheries management has shown itself to be responsive to this risk assessment and attempts to minimize impacts.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• An ecological risk assessment has been conducted, based on knowledge of functional relationships, to determine the potential impacts of the fishery on the genetic, species and population level biodiversity endangered, threatened or protected species. Fishery management is constrained to minimize impacts on the basis of this risk assessment. Impacts are held below levels that would be unacceptable.</li> </ul> <p>We consider that the performance of the fishery now clearly lies between 80 and 100: various</p>

	<p>studies have been undertaken to monitor and estimate the potential impact of the fishery on the genetic, species and population level for endangered, threatened and protected species; a transparent industry based solution to reducing bycatch has been implemented and is responsive to the results of the monitoring and research and has reacted to minimise the impacts.</p> <p>The score allocated to this Performance Indicator is now raised to 80.</p> <p>This condition has now been closed and the outcomes of ongoing associated work will be reviewed as a function of annual surveillance audits. In particular, the on-going work and measures that have been implemented to reduce salmon bycatch will be reviewed at the next annual audit.</p>
<p><b>APA Progress Report</b></p>	<p><b>Salmon Bycatch</b></p> <p>Since the implementation of the groundfish management plans for Alaska, the North Pacific Fishery Management Council (NPFMC) has considered and adopted numerous measures intended to control the bycatch of species taken incidentally in the groundfish fisheries. Certain bycatch species are designated as ‘prohibited’ in the groundfish plans (PSC) because they support traditional fisheries off Alaska. These PSC species include Pacific halibut, Pacific herring, Pacific salmon, steelhead trout, king crab, and tanner crab. These species and species groups must be avoided while fishing for groundfish, and when incidentally caught, they must be immediately returned to the sea with a minimum of injury. To reduce the bycatch of PSC, various control measures have been implemented. For example, both halibut bycatch limits (groundfish fisheries are closed when the limits are reached) and closed areas to protect red king crab from bottom-trawling have been established. However, no control measures yet exist for salmon or other spider crabs taken incidentally in GOA groundfish fisheries.</p> <p>In 2005 the NPFMC indicated that alternatives to control PSC bycatch in the GOA should be considered, and a preliminary analysis of options was developed. During 2007 the analysis was updated, and a preliminary version made available at the April 2008 meeting (NPFMC 2008c). In June 2008, the NPFMC chose to limit considerations to two species and two areas: Chinook salmon (<i>Oncorhynchus tshawytscha</i>) and tanner crab (<i>Chionoecetes bairdi</i>) in the central and western GOA. Non-pelagic trawling and pot gear are responsible for most <i>C. bairdi</i> bycatch in the GOA (in 2003, 2004, and 2006 non-pelagic trawl gear accounted for over 90 percent of <i>C. bairdi</i> bycatch; NPFMC 2009). Because pollock fishing in the GOA is conducted almost exclusively with pelagic trawls, crab bycatch is not a first-order concern.</p> <p>Table 4 of NPFMC (2009) shows Pacific salmon bycatch in the GOA groundfish fisheries from 1990-2008. The average 1990-2007 is 21,606 for Chinook. For 2003-2007 the average for Chinook salmon is 25,312. Bycatch of Pacific salmon in the GOA occurs mainly by the pollock fishery (Table 7 in NPFMC 2009). In 2005-2007, pelagic trawl gear accounted for over 80 percent of Chinook salmon bycatch. Averaged over 2003-2007, bycatch in the pollock fishery represents about 75 percent of total Chinook bycatch, or about 18,500 fish annually.</p> <p>The location and timing of Chinook bycatch is fairly well known and follows a predictable pattern in most years. Chinook are taken regularly from the start of the groundfish fisheries on January 20th through early April, and then also during June-July and September-October in the pollock fishery. Pollock fishery bycatch varies year-to-year among reporting areas. While bycatch in the western GOA is consistently lower than it is in the central GOA, the proportional bycatch by area within all years 2003-2008 is highly variable. For example, the highest bycatch in the Chignik area (area 620) occurred in 2007 (28,034 Chinook) while in the Kodiak area (area 630) 2005 was the highest bycatch year with 13,370 Chinook.</p> <p>The effect of Chinook salmon bycatch by the GOA groundfish fisheries on the sustainability of salmon populations is difficult to gauge without specific information on the river of origin of bycatch salmon. No studies to determine the origin of bycatch salmon have been conducted in the GOA trawl fisheries, although some limited sampling has occurred in the Bering Sea pollock fishery. Chinook salmon tags have been recovered in the area around Kodiak from 1994, 1997, and 1999. The majority of tags from non-Alaska Chinook salmon indicated that the fish would return to British Columbia. A low incidental harvest of Chinook salmon from</p>

	<p>Cook Inlet was also indicated (Dinnocenzo and Caldentey 2008).</p> <p>Recent research advances on stock discrimination for Chinook salmon is focused on the development of DNA-based methods to determine salmon stream of origin via analysis of microsatellite variation and single nucleotide polymorphisms (SNPs). To this end, baselines have been developed that catalogue the DNA composition of many BSAI and GOA salmon stocks. However, until trawl bycatch samples can be collected and analyzed there is no information to determine what proportion of GOA Chinook bycatch is attributable to rivers in the GOA or elsewhere. The Alaska Fishery Science Center is developing a research plan for sampling Chinook bycatch, but the focus is now on bycatch in the Bering Sea pollock fishery.</p> <p>Some on-paper analysis of alternatives to manage Chinook salmon and tanner crab bycatch now exists (NPFMC 2009). A purpose and need statement is required next. Purposes for reducing bycatch include:</p> <ol style="list-style-type: none"> <li>1) bycatch amounts represent a conservation concern;</li> <li>2) bycatch impacts directed fisheries for the bycatch species; and</li> <li>3) bycatch amounts are at a socially unacceptable level.</li> </ol> <p>Management options include time-of-use area restrictions, perhaps applying only to a single gear type or target fishery, and that could be triggered by attainment of a bycatch amount, as well as incentives for industry-cooperative bycatch management to avoid bycatch "hotspots." The draft Chinook bycatch management alternatives in the NPFMC analysis include:</p> <p>Alternative 1: Status quo (no bycatch controls).          Alternative 2: Area bycatch limits for salmon.          Alternative 3: Seasonal closure to all trawling in areas with high bycatch.          Alternative 4: Voluntary bycatch cooperative for hotspot management.</p> <p>Because is difficult to gauge with any certainty to what degree the amount of bycatch taken in the GOA groundfish fisheries is likely to affect the sustainability of salmon and crab populations, the draft analysis does not yet contain any bycatch limit amounts. However the analysis does show several areas designated as candidate closure areas due to bycatch in the pollock fishery (Figures 32-33 in NPFMC 2009). The areas are located on the northern side of Shelikof Strait, in Marmot Bay, and off Cape Barnabus on Albatross Bank. The NPFMC is scheduled to consider this issue again at its October, 2009 meeting.</p> <p>A significant issue for salmon bycatch management in the GOA concerns the large number of vessels where observer coverage is required for 30 percent or less of their fishing days (vessels less than 60 feet in length are not required to carry observers). This situation results in a large fraction of unobserved groundfish catches with bycatch amounts of species such as salmon estimated via extrapolations based on the catches of observed vessels. For a number of reasons, this catch accounting system can sometimes result in highly variable salmon bycatch estimates, and also can generate estimates that are known to be inaccurate (e.g., see Balsiger 2008). Addressing these bycatch estimation issues will require a fairly extensive restructuring of the observer program in the GOA. This effort is currently on-going but will likely require several more years of work and the identification of new sources of funding before it can be appropriately addressed.</p>
<p><b>Observations</b></p>	<p>Salmon bycatch, particularly of Chinook salmon, did not appear to escalate as much in the 2005/6-2007/8 period in GOA as was observed in BSAI. Nonetheless, the average of bycatch estimates for the mid 2000's was 20% above the average for all estimates since the early 1990s and, given the depleted state of many Chinook stocks, reduction of bycatch should be a priority in all fisheries. Because of the very different fleet composition of pollock fisheries in GOA compared to BSAI, observer coverage of all fisheries targeting pollock is also less complete, so data on frequency, timing, and location of salmon bycatch is less complete. These two factors (lesser relative and absolute increase in bycatch and fewer data to use in investigating mitigation options) have meant that management measures implemented in the BSAI pollock fishery, such as "rolling hotspots", have not yet been implemented in the GOA fishery. A variety of measures has been developed and will be considered by the NPFMC in the fall of</p>

	<p>2009.</p> <p>If the GOA pollock fishery is re-certified, bycatch data from 2008 and 2009 fisheries, and decisions by the NPFMC fall meeting, will have to be scrutinized carefully as part of the 2010 audit. Salmon bycatch levels and effectiveness of measures intended to minimize it, will also need to be monitored carefully.</p>
<p><b>9</b></p>	<p><b>Condition of Certification 9.</b> The management system keeps impacts of the fishery on protected species within agreed and reasonable bounds, and keeps impacts on threatened or endangered species within the limits set by the Endangered Species Act.</p>
<p><b>Conclusion of Surveillance Report 1</b></p>	<p>Parts 9.1 and 9.2 of this Condition have been met and were closed in the first year of certification.</p>

<b>10</b>	<b>Condition of Certification 10.</b> Assessments are conducted to identify and estimate impacts of the fishery on protected, endangered, threatened or icon species.
<b>Assessed Activity</b>	<p>This Condition relates principally to Indicator 2.3.1, but Indicators 2.3.3; 3.2 and Principle 3 Indicators 1.2 and 4.1.8 also relate.</p> <p>The intention of this performance indicator is to evaluate the extent to which the fishery can demonstrate that it does not have unacceptable impacts on protected, endangered, threatened or icon species, and particularly those identified for protection under United States legislation.</p> <p>Elements considered in scoring include:</p> <ul style="list-style-type: none"> <li>• Information on the direct interactions of the fishery with protected, endangered, threatened or icon species, such as through by-catch, entanglement with lost fishing gear, effects on behaviour, or physical disruption of seabird and sea mammal populations is available, and management strategies have put in place systems to reduce direct impacts to minimum levels.</li> <li>• Information on the indirect interactions of the fishery with protected, endangered, threatened or icon species, such as through alterations to their foraging opportunities, is available, and management strategies have put in place systems to reduce indirect impacts to minimum levels.</li> <li>• Levels of impacts on protected, endangered, threatened or icon species do not have detrimental effects on their populations.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <p>Direct and indirect impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size (defined as causing a significant decrease in population size or a significant risk of local extinction).</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Direct impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size.</li> <li>• Indirect impacts of fishing (including food competition, changes in foraging behaviour, disruption to animals and prey fields) on all protected, endangered, threatened and icon species have been examined and the evidence suggests that these impacts are below levels that harm population size.</li> <li>• Research needed to measure indirect impacts of fishing on all protected, endangered, threatened, and icon species is being carried out.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <p>Knowledge of direct and indirect impacts of the fishery on protected, endangered, threatened and icon species is fragmented, incomplete and inadequate to permit management to develop methods to limit these impacts to within agreed and reasonable bounds. Research being carried out is not adequately focused to provide the missing information.</p> <p><b>SCORE 79</b></p> <p>Direct impacts of the fishery are generally well known, monitored, and mostly held at levels that do not harm populations (National Marine Fisheries Service, 2001a). Some concern was expressed by the recent NRC review panel that entanglement might be contributing significantly to the decline of the Steller sea lion, suggesting that further assessment of that hypothesis is required (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002).</p> <p>Indirect impacts are even more difficult to assess. An experimental approach would be required to test the key hypothesis that Steller sea lion foraging is affected by harvest of pollock from SSL critical habitat. Although such an approach has been proposed by NMFS, it</p>

	<p>has not yet been carried out. In the absence of conclusions from research into the effects of the fishery on prey fields for dependent predators such as Steller sea lion, management cannot take these interactions into account except by precautionary limits to the fishery.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, the fishery must design and carry out experiment(s) to test the possible impact of the pollock fishery on Steller sea lions by comparing outcomes of regulated levels of fishing in experimental and control areas on SSL behaviour, breeding and population trends. The NRC report (Committee on the Alaska Groundfish Fishery and Steller sea lions, 2002) recommends that the fishery should design and carry out an experimental test of the hypothesis that fishing influences SSL population dynamics. We support the goals and objectives of the NRC's prescribed action, but appreciate that it would be inappropriate to suggest increasing pollock fishing intensity to levels that increase jeopardy (in the legal sense) to SSL populations and that there are complex scientific and legal issues involved. Therefore, it will be necessary to design this experiment in such a way that comparison can be made between areas where fishing intensity is reduced with areas where it is maintained at levels comparable to those in the recent past (but perhaps within this limit still increased by as much as the decrease in harvest lost to industry from reduced fishing areas). The hypothesis to test would then be that SSL numbers or productivity in reduced fishing areas would show a positive deviation relative to values in fished areas, and the null hypothesis that performance of SSL would be no different between areas. Such an experiment should be underway no later than 2006.</p>
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<b>APA Activity</b>	<p><i>This Condition is identical for the BS/AI and GOA pollock fisheries; however, the certification body required changes from the version approved for the BS/AI Pollock Action Plan. The Final Reports on BS/AI and GOA Alaska pollock recognize the legal and practical impediments identified by fishery management authorities and scientists to conducting the controlled area experiments proposed by the National Research Council (NRC) in 2002. In addition, NMFS's scientists have provided fishery management authorities with a detailed analysis of the substantial cost of such experiments, the decades-long commitment required for such a program and the likely prospect that the findings would be inconclusive.</i></p> <p><i>Notwithstanding the issues identified above, APA is aware that AFSC is in its fourth year of research testing the localized depletion hypothesis and will continue with its program if FY 2005 funding is available through Congressional appropriation. (See discussion under Condition #5 above.) NMFS' previous work on possible fishing effects on SSLs has examined fisheries for Alaska pollock, Pacific cod and Atka mackerel. APA will request a meeting with AFSC and the certifier within six months to review research results to date and to discuss ongoing research. APA will consult with the certifier and AFSC prior to the meeting to ensure all issues relevant to both groups are addressed at the meeting. APA and the certifier conducting the post-certification audits have agreed that the members of the original assessment team shall be consulted as well. In addition, APA will propose that the meeting include a thorough discussion on the current state of research on hypotheses relating to possible effects of pollock fishing on foraging sea lions, including agency-sponsored research and research projects conducted under the auspices of the Alaska SeaLife Center, the Pollock Conservation Cooperative Research Center, the North Pacific Research Consortium, and other noted authorities such as the recent work by Dr. Marc Mangel contracted by NMFS through MRAG Americas Inc..</i></p> <p><i>A review (summary of the meeting result) will be prepared by APA. In specific, the review will contain a thorough analysis of how the current research meets the condition, which is to conduct a direct experiment. APA will prepare and provide this report to the certification body detailing actions and timelines for meeting the objectives of this condition should the results of the meeting between APA, NMFS and the certification body identify continuing research needs to meet the condition.</i></p> <p><i>Tasks performed under this Condition will be coordinated with the responses to Condition #5, Condition #6 and Condition #7.</i></p>
<b>Conclusion of Surveillance Report 1</b>	<p>Progress to date is considered to be satisfactory. As discussed above, relevant experiments have been designed and begun, complemented by modelling studies. Given the timescales over which such work is necessarily undertaken, and the clear commitment of NMFS to carry out such work, future reports will monitor continuing progress in this area, including any opportunities for participation by the membership of the certified fishery and the consideration of work such as that by Professor Mangel and colleagues.</p> <p>The results of ongoing work by NMFS and others will be considered more fully in the second surveillance report, together with the results of the review undertaken by Professor Boyd and the comments provided by Prof Furness.</p>
<b>Conclusion of Surveillance Report 2</b>	<p>Given the difficulty embodied in this Condition, and the differences in scientific opinion as to the value of conducting a large-scale field experiment, the surveillance team feels that progress has been satisfactory. This conclusion is based on the findings of the Boyd report and the promising work involving the simultaneous testing of alternative hypotheses for the decline using multiple sources of data.</p> <p>With the aforementioned difficulties, providing an absolute timeline for meeting this Condition presents a challenge. That said, APA continues to progress toward meeting this Condition by facilitating meetings, contributing to detailed discussions and ensuring that research continues in a targeted way.</p>
<b>Conclusion of Surveillance</b>	<p>Any large-scale manipulative experiment with a reasonable chance of testing hypotheses about the effects of pollock fishing on SSL would required 5-10 years to conduct. Thus, even if such</p>

<b>Report 3</b>	<p>an experiment had been planned when the fishery was certified, it is unlikely that the results of the experiment would have been available during the life of the first certification.</p> <p>Nevertheless, the analyses unplanned experiments resulting from Steller sea lion management measures, statistical modelling to test alternative hypotheses, ecosystem modelling of the effects of the pollock fishery on dependent species, and new research identified in the new Steller sea lion Recovery Plan go some way to meeting this condition. The 2007 RFP for further development of the Wolf and Mangel approach was an additional welcome step, but future RFP's should recognize that several years of research will be needed to make this happen. Taken together, we feel that progress on this condition is satisfactory.</p>
<b>APA Progress Report</b>	<p>Since Marine Stewardship Council (MSC) certification of the Alaska Pollock Fisheries, several recommendations have been offered as concerns the best means to further evaluate the potential for competition for pollock-as-prey between the pollock fishery and the western distinct population segment (DPS) of Steller sea lions (SSLs). These are summarized below in the context of the nature and feasibility of an experiment to assess the potential for interactions between SSLs and the commercial fisheries.</p> <p><b>National Research Council</b></p> <p>The National Research Council (NRC 2003) review of the causes of the Steller sea Lion (SSL) decline suggested five options to evaluate the efficacy of management actions placed on the commercial fisheries to reduce their potential impacts on SSL. Their favoured option was to establish spatial management units consisting of two sets of closed and open areas where each treatment area is centred on a rookery. They suggested that the western population of the SSL should be divided into management regions and that at least two "closed" and "open" rookeries would be monitored in each region. They reasoned that, because most monitoring activities are conducted at rookeries and that SSL were thought to be more vulnerable close to rookeries, the rookeries should be the focus of the study. They further stated that, under this option, the most critical monitoring needs would be detailed local SSL censuses and spatial analyses of fish population changes for each experimental unit in the overall design.</p> <p><b>Suggestion of Dr. Boyd Concerning a Statistical Modelling Experiment</b></p> <p>During 2006, the At-sea Processors Association requested that Dr. Ian Boyd of the Sea Mammal Research Unit at the University of St Andrews summarize recent research on the evidence for local effects of the pollock fishery upon pollock distribution and abundance, and the potential this may have to affect the SSL (Boyd 2006). The assessment focused on what can be said about the relationships between SSL foraging behaviour and pollock-as-prey abundance at the local scale related to putative fish-school disruption caused by trawling in localized areas.</p> <p>Dr. Boyd considered the scientific basis for this potential threat to the SSL within a risk assessment framework, and recommended that additional resources be devoted to evaluating the "fishery competition hypothesis" by exploiting a diverse range of evidence using statistical maximum likelihood modelling experiments. For example, existing analyses (Pascual and Adkison 1994, Wolf and Mangel 2004) could be extended to incorporate state-space (or hidden process) models and other fitting methods such as Markov chain Monte Carlo analysis. These analyses were thought better suited to the diversity of data types available and have the advantage that they can provide a rigorous framework for statistically-valid decision making with all the available data, not just a small subset that would be created from the kind of experimental approach recommended by the NRC. It was argued that this approach is also better aligned with the risk assessment structure now being used, albeit implicitly and informally, to assess the potential causes of the SSL decline.</p> <p><b>Aleutians Islands Cooperative Acoustic Survey Studies</b></p> <p>In 2006 the Aleut Corporation, in partnership with the National Marine Fisheries Service (NMFS) Alaska Fishery Science Center, Adak Fisheries LLC, and the owners and operators of the F/V Muir Milach, conducted the Aleutian Islands Cooperative Acoustic Survey Study (AI CASS) to test the technical feasibility of conducting acoustic surveys of pollock in the AI using small (less than 32 meter) commercial fishing vessels (Barbeaux 2006). The study was conducted under an exempted fishing permit (EFP) that allowed directed pollock fishing</p>

within SSL critical habitat. The CASS is intended to provide a first step in the development of a co-management and monitoring relationship among the Aleut Corporation (the Alaska native corporation that has been allocated the pollock quota in the AI area), local fishermen, and the NMFS. In the future, such a relationship could potentially allow for routine, limited pollock harvests inside SSL critical habitat that explicitly account for SSL foraging requirements.

The AI CASS was repeated from March 17 to April 20, 2007. The survey covered the area between Seguam Island and Amchitka Pass (longitude 173°W to 179°W) on the north side of the Aleutian Islands archipelago. To verify the acoustic data and offset research costs, 1,300 metric tons of pollock were harvested within an area that included waters within 20 nm of SSL haul-outs and rookeries. Fishing within SSL critical habitat was necessary because pollock aggregations had to be found to offset costs, and historical information about the occurrence of pollock indicated that pollock aggregations were likely to occur inside SSL critical habitat. The harvest was permitted under an EFP awarded to the Aleut Enterprise Corporation.

The 2008 AI CASS was expanded significantly due to increased funding provided by the North Pacific Research Board. The pollock assessment survey was expanded to include an echo-integration trawl (EIT) survey by the R/V Oscar Dyson conducted from March 17 to April 20. This will be followed by a survey of the Tanaga-Kanaga area to Great Sitkin by the F/V Muir Milach. In addition, the National Marine Mammal Laboratory (NMML) will conduct an aerial distribution study and a land-based scat study of SSL haul-outs timed to coincide with the fishery resource surveys (Loggerwell *et al.* 2009, Barbeaux *et al.* 2008). The NMML component is designed to refine SSL monitoring and resource assessment methods such that small-scale experiments to assess the effects of fishing on SSL foraging could be carried out.

#### **Steller Sea Lion Recovery Plan**

The NMFS completed a revised "Recovery Plan for the Steller Sea Lion" in March, 2008. The Plan identified 78 new substantive actions needed to achieve recovery of the western distinct population segment (DPS). The Plan highlights four actions considered especially important to the recovery program (NMFS 2008). These were:

- 1) continue population monitoring and research on threats potentially impeding sea lion recovery;
- 2) maintain current or equivalent level of fishery conservation measures;
- 3) design and implement an adaptive management program to evaluate fishery conservation measures; and
- 4) develop an implementation plan.

The Plan states that current information on the primary threats is insufficient to assess their impact on recovery, and that focused research is needed on how these threats impact sea lion population growth and how they may be mitigated in order to facilitate recovery. Thus, population monitoring and research in the context of an adaptive management program are suggested. The rationale for the adaptive management program is as follows:

Due to the uncertainty as to how fisheries affect Steller sea lions and their habitat, and the difficulty in extrapolating from individual scientific experiments, a properly designed adaptive management program should be implemented. This type of program has the potential to assess the relative impact of commercial fisheries and to better distinguish the impacts of other threats (including killer whale predation). This program will require a robust experimental design with replication at the proper temporal and spatial scales with the appropriate levels of commercial fishing as experimental treatments. It will be a challenge to construct an adaptive management plan that meets the requirements of the ESA, is statistically sufficient, and can be implemented by the commercial fisheries. Acknowledging these hurdles, a significant effort must be made to determine the feasibility of such a program (NMFS 2008).

A large portion of the effort to develop recovery criteria for the SSL was allocated to the development of a population viability analysis (NMFS 2008, Appendix). The PVA model may be useful in further developing the statistical modelling experiments recommended by Dr. Boyd (2006).

### **Pollock Conservation Cooperative Research Center**

The Pollock Conservation Cooperative Research Center issued a request for proposals for 2009 with a focus area “Factors Influencing the Sustainability of Marine Mammal Populations.”

The request included the specific desire of an assessment of the feasibility of adaptive management experiments to test the efficacy of Steller sea lion mitigation measures, including non-traditional modelling methods such as those of Wolf and Mangel (2004). Unfortunately, this request (see below) received no responses. As such, it is suggested that the 2009 MSC surveillance visit include a discussion with NMML researchers about the plans of the NMFS for further evaluation of potential interactions between SSLs and the commercial fisheries. As the NMML will play a pivotal role in any attempt to construct an experimental approach to assessing interactions that meets the requirements of the US Endangered Species Act, increased knowledge of their plans would be useful.

### **PCCRC Research Priorities for 2009 (excerpt)**

For the 2009 funding cycle, the PCC Research Center is especially interested in trying to improve knowledge through research and education in the following subject areas:

#### **1. Factors Influencing the Sustainability of Steller Sea Lion Populations**

Proposals to assist in the evaluation of:

- a) the “fishery competition hypothesis” by exploiting a diverse range of evidence using statistical maximum-likelihood modelling experiments. The recovery plan for the endangered Steller sea lion (SSL) recommends a long-term, field-based adaptive management experiment to test the fishery competition hypothesis. However, such an experiment is challenging to construct, would require 10-15 years before any conclusions could be drawn, and may not provide an unequivocal result. There are alternative approaches that may be more effective and may better align with the risk assessment framework now being used, albeit implicitly and informally, to assess the potential causes of the SSL decline. For example, existing analyses (e.g., Wolf and Mangel 2004 [[www.soe.ucsc.edu/~msmangel/Steller%20final.pdf](http://www.soe.ucsc.edu/~msmangel/Steller%20final.pdf)]) could be extended to incorporate state-space (or hidden process) models. What is desired is a type of meta-analysis which evaluates the likelihood of the hypothesis by combining all available data and studies, not just data from a single study.
- b) population viability analysis as a tool to assess extinction risk in the western population of Steller sea lions;
- c) natality studies as a tool to assess changes in mortality and survival in the western population of Steller sea lions.

### **Marine Conservation Alliance**

The Marine Conservation Alliance has contracted with Dr. Boyd to undertake the development of a PVA and a risk-analysis framework for future management options for SSLs. To complete the project, Dr. Boyd will undertake several tasks. The first is to review the data used to construct the existing SSL Recovery Plan PVA and new data that have become available since the development of that PVA. Of particular interest will be an examination of the uncertainties that are inherent in the data and how they may relate to the estimation of population status and vital rates (especially female reproductive rates, or natality), predation, historical information regarding human caused direct mortality and its impacts to SSL populations (particularly recently gathered historical data during the population declines of the 1980s), and other relevant information that might better inform development of alternative PVA approaches.

An approach will be then developed which produces a PVA for SSLs that explicitly accounts for uncertainty in the data and places this at the centre of a risk-based management approach for the SSL. The approach to achieve this objective is to provide a basic PVA model for Steller sea lions that includes 1) a core PVA based upon historical population trajectories including uncertainty; 2) a meta-population structure; 3) density-dependence if appropriate and if evidence can be found for a density effect; and 4) development of future scenarios based upon past dynamics.

	<p>The intent is to supply a PVA structure in computer code (standard C) that can be accessed and modified by others. Model inputs and outputs will eventually be provided in a spreadsheet format so that those wishing to modify the PVA can do so without the need to understand the underlying program. The new PVA structure will be reviewed by several independent experts and Dr. Boyd will discuss the PVA with NMFS and NMML scientists to seek their advice and answer their concerns regarding the PVA. Finally, Dr. Boyd will prepare a report for submittal to the NMFS and the NPFMC at the June, 2008 meeting. This report will include an analysis of the types of data described above and the PVA structures well as a suggested risk-based approach to future management of the SSL.</p>
<b>Observations</b>	<p>A large-scale field experiment to determine the effects of the pollock fishery on the dynamics of SSL has not been conducted despite the fact that several groups have called for such experiments. As noted in past audits, suggesting such an experiment or experiments is clearly easier to do than designing an experiment with a reasonable chance of testing the hypothesis. Although the concept was again given some support in the Revised Steller sea lion Recovery Plan (NMFS 2008), we are unaware of plans by NMFS to conduct such an experiment. Also, we have noted in the past that the idea of such an experiment is not without detractors.</p> <p>Once again in 2009, The Pollock Conservation Cooperative Research Center requested proposals to investigate “Factors Influencing the Sustainability of Marine Mammal Populations” with a focus an assessment of the feasibility of adaptive management experiments to test the efficacy of Steller sea lion mitigation measures, including non-traditional modelling methods such as those of Wolf and Mangel (2004). As in 2007, no proposals were received.</p> <p>That the recommended large-scale field experiment has not been conducted, in our view, should not diminish the multiple and continued efforts to gain insight into the effect of the Pollock fishery on Steller sea lion demography. These approaches have included an analysis of the effect of SSL no-trawl zones on trends in abundance, a series of smaller scale experiments to test the hypothesis that fishing effects the local pollock abundance and by inference could negatively impact sea lions, the multiple hypothesis approach of Wolf and Mangel (2004), and the extensive ecosystem modelling in which fishery effects have been extensively explored.</p>
<b>Conclusion</b>	<p>It is concluded that, in reference to the original 80 Scoring Guideposts, that require the direct and indirect impacts of the fishery on protected, endangered, threatened and icon species to be studied and considered to be below a level that would cause harm to population sizes, this condition has been reasonably satisfied with respect to concern for Steller sea lions.</p> <p>On the basis of the above commentary the score associated with the Performance Indicator 2.3.1 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Direct impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size.</li> <li>• Indirect impacts of fishing (including food competition, changes in foraging behaviour, disruption to animals and prey fields) on all protected, endangered, threatened and icon species have been examined and the evidence suggests that these impacts are below levels that harm population size.</li> <li>• Research needed to measure indirect impacts of fishing on all protected, endangered, threatened, and icon species is being carried out.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <p>Direct and indirect impacts of fishing on all protected, endangered, threatened and icon species are measured and are known to be below levels that harm population size (defined as causing a significant decrease in population size or a significant risk of local extinction).</p> <p>The score allocated to this Performance Indicator is now raised to 85. This condition has now been closed.</p>

11	<p><b>Condition of Certification 11.</b> There are sufficient data, and understanding of functional relationships, to determine what changes in fishery management are necessary to recover depleted populations of impacted species.</p>
Assessed Activity	<p>This Condition principally relates to Indicator 3.3.</p> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>Alterations to fishing to recover and rebuild depleted species are based on a sound understanding of functional relationships between the impacted population and the fishery. This includes understanding predator-prey dynamics, species interactions, prey abundance/spatial distribution, foraging behaviour, food web requirements and habitat needs.</li> </ul> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>Alterations to fishing to recover and rebuild depleted species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts.</li> </ul> <p><b>60 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>Alterations to fishing to recover and rebuild depleted species are based on incomplete data, and are of largely unknown efficacy.</li> </ul> <p><b>SCORE: 79</b></p> <p>The score is better for fish stocks than it is for marine mammal populations, while less is known about interaction between the fishery and depleted populations of seabirds. Alterations to fishing to recover and rebuild depleted species are based on very incomplete data and understanding. In the GOA it is difficult to make a strong case that management to recover populations of depleted marine mammals has been precautionary, since the quantities of pollock removed from SSLCH have hardly been reduced from their previous high levels despite the series of different restrictions placed on fishing close to SSL rookeries and haul outs in recent years. Bernstein <i>et al.</i> (2002) suggest 'Where the knowledge payoff would be great, leading to better conservation and management of the ecosystem, ways should be found to carry out meaningful field experiments using the fishery'.</p> <p>The fact that it is unclear whether the fishery is the cause of declines in SSL populations is not a satisfactory reason for lack of action. The uncertainty over impact should have led to research to identify whether or not the fishery is the cause, and management should have responded in a timely manner and to introduce precautionary management until the cause effect relationship had been resolved. According to APA (APA 2002; p106) 'As the hypothesized interactions between the Alaska groundfish fisheries and the vulnerable pinnipeds involve indirect ecosystem effects that are thought manifest via a localized depletion of prey resources, and thus intense competition for these resources, an appropriate research and monitoring program would be one that investigates and monitors the effect of the groundfish fisheries on the SSL prey field'. It is surprising that this research, identified as key to understanding by APA, has only just begun to be tackled and that no clear information on this question can yet be reported.</p> <p>Furthermore, this is but one specific hypothesis relating to effects of the fishery on SSL prey fields; given the satellite tracking data indicating that SSLs may range over very large areas in search of food (National Marine Fisheries Service, 2001d), there are equally important questions yet to be tackled concerning how SSLs respond to reductions in pollock stock biomass, both at a local 'prey-field' scale and at a larger ecosystem scale. This is especially important given the current situation in the GOA where pollock biomass has declined to only about 29% of predicted unfished biomass.</p> <p>For the relationships between the pollock fishery and depleted populations of harbor seals, kittiwakes and murrelets, very little is known, and so it is difficult to prescribe management of the pollock fishery that should help to recover these populations. There is, therefore, a need for research to determine what pollock biomass or density is required by populations of these species in order to permit them to forage at rates that support healthy populations and reproduction.</p> <p><b>CONDITION:</b> To improve the deficiencies in performance for this indicator, it is important</p>

	that the fishery be able to determine the effects of pollock fishing on other species in the area other than Steller Sea Lions. Specifically, SCS is requiring that the fishery also collect data on harbor seals, kittiwakes and murre, when conducting the work required under Condition 2.3.1.
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<b>Conclusion of Surveillance Report 1</b>	<p>Relevant experiments have been designed and begun, but research should more clearly seek to identify the linkages between the dynamics of these species and the pollock fishery. This may build on successful experience with current studies on Steller sea lion.</p> <p>As for Condition 10, given the timescales over which such work is necessarily undertaken, and the clear commitment of NMFS to carry out such work, future reports will monitor continuing progress in this area, including any opportunities for participation by the certified fishery.</p> <p>Progress on this condition is satisfactory.</p>
<b>Conclusion of Surveillance Report 2</b>	<p>The surveillance team is satisfied with the level of commitment and 'active management' to better understand the effects of the pollock fishery and pollock abundance on dependent species other than SSL. This is not an easy task and thus we expect that progress in the area (as with Condition 10) will be slow and incremental.</p>
<b>Conclusion of Surveillance Report 3</b>	<p>The surveillance team is satisfied with the high level of commitment to better understand the effects of the pollock fishery and pollock abundance on dependent species other than SSL. This is not an easy task and, as noted previously, progress in the area (as with Condition 10) will be incremental. Progress is satisfactory.</p>
<b>APA Progress Report</b>	<p><b>Harbor Seal Abundance</b></p> <p>Estimating the statewide abundance of harbor seals (<i>Phoca vitulina</i>) in Alaska has always been challenging. Harbor seals range from south-eastern Alaska through the Aleutian Island chain into Bristol Bay. Past efforts have involved dividing the state into five regions and conducting aerial surveys from small aircraft in one of the regions annually. As such, a complete population estimate was obtained just once every five years, and year-to-year trends were determined from surveys conducted by the Alaska Department of Fish and Game (ADFG) at a small subset of sites. In 2008 the National Marine Mammal Laboratory (NMML) implemented a new, comprehensive approach to the measurement of harbor seal abundance that revised the design and methods of aerial surveys of harbor seals in coastal regions and tidewater glacier habitats (London <i>et al.</i> 2009).</p> <p>The new approach allows surveys to be conducted annually across the entire range. This is accomplished by dividing the coastline into distinct survey units and focusing survey effort such that units with more seals are surveyed more frequently. This approach was first implemented for the statewide surveys in August, 2008. Seven planes were distributed throughout most of the range and new technologies were used to improve navigation and data collection efficiency during the surveys. The approach also incorporates a new model of haul-out behaviour based on the deployment of over one hundred satellite tags. The behavioural model accounts for effects of time of day, day of year and tidal state. For example, harbor seals are more likely to haul-out near mid-day within 15 minutes of the low tide during the August moult period. It is estimated that approximately 70 percent or more of the seals hauled out during the survey were photographed from the air. Not only is the behavioural model important for estimating the number of seals in the water at the time of a survey, it also provides additional flexibility in the timing and implementation of the survey.</p> <p>Glacial fjords contain the largest aggregations of harbor seals during pupping and moulting. Seals are dispersed over enormous areas of floating ice and this makes estimating abundance using conventional, oblique photography challenging. A new aerial sampling method which captures higher quality imagery of seals at low altitudes (1000 ft) along line transects using a down-looking, high-resolution digital SLR camera was tested to address this issue. It appears the new camera and low over-flights can also provide estimates of size and age distributions and pup production adequate for population modelling. In addition, advances in digital photography, automatic geocoding of images, and handheld navigation systems have dramatically improved the efficiency of data collection.</p> <p><b>Harbor Seal Stock Structure</b></p> <p>In 2002 the National Marine Fisheries Service (NMFS) obtained new genetic information on harbor seals in Alaska which indicated that the current boundaries between the Southeast Alaska, Gulf of Alaska, and Bering Sea stocks need to be reassessed. NMFS, in cooperation</p>

with the Alaskan Native community, is evaluating the new genetic information and planned to make a recommendation regarding stock structure in 2007 (Angliss and Outlaw 2007). As such, a complete revision of the Alaska harbor seal assessment has been postponed until the new stock boundaries are defined. However, the Alaska marine mammal stock assessment for 2007 does report new information on harbor seal abundance and mortality trends in the context of the existing stock structure. This information updates that from the 2001 assessments provided in the At-sea Processors Association application for Marine Stewardship Council certification of the BSAI and GOA pollock fisheries. No new information on harbor seals is provided in the draft 2008 marine mammal stock assessment.

As noted, harbor seals in Alaska are managed as three stocks: Bering Sea; Gulf of Alaska, and Southeast Alaska. The GOA stock includes seals in the AI. Harbor seals are not listed as “depleted” under the US Marine Mammal Protection Act or listed as “threatened” or “endangered” under the US Endangered Species Act. The updated harbor seal abundance estimates resulted from improved methods to derive estimates of population size from aerial surveys which document the number of seals hauled out on shore. Many factors influence the propensity of seals to haul out, including tides, weather, time of day, and date in the seals’ annual life history cycle. A statistical model defining the relationship between these factors and the number of seals hauled out was developed for each survey region. Based on those models, the survey counts for each year were adjusted to the number of seals that would have been ashore during a hypothetical survey conducted under ideal conditions for hauling out. A separate analysis of radio-tagged seals and a similar model-based estimate of the proportion of seals hauled out under ideal conditions were used to verify the method (Angliss and Outlaw 2007).

A second change in the assessment concerns how incidental takes in the commercial fisheries are monitored. For example, in the previous stock assessment, the commercial trawl fisheries were monitored as a single fishery. In the current assessment, the commercial fisheries are separated based on gear type and the target species. For the GOA stock, the change resulted in the tracking of incidental takes for 22 separate fisheries based on both gear type and target species. For the Bering Sea stock, the change resulted in the monitoring of incidental takes for 14 separate fisheries. These changes in how the incidental takes are monitored does not reflect a change in fishing effort, but provides managers with better information on the component of each fishery that is responsible for the incidental serious injury or mortality of marine mammal stocks in Alaska. Current management policy states that reliable estimates of commercial-fishery-related annual mortality levels less than ten percent of the potential biological removal (PBR) can be considered insignificant and approaching a zero mortality and serious injury rate.

Tables 2 and 3, below, compare the harbor seal data from the 2001 assessment with recent data from the 2007 assessment. In general, stock abundance estimates have increased and incidental mortalities in the groundfish trawl fisheries have decreased over the most recent five-year period 2000-2004. The switch to monitoring incidental takes by commercial fishery gear type and target species now permits an evaluation of harbor seal incidental takes by trawlers fishing pelagic gear and targeting Alaska pollock in the BSAI and GOA fisheries. For the most recent five-year period 2000-2004, recorded incidental takes of harbor seals in the BSAI and GOA pollock fisheries were zero.

Table 2. Bering Sea harbor seal minimum population estimates, stock trends, PBRs, and incidental mortalities in the BSAI and GOA trawl fisheries, 2001 and 2007.

Min. Pop. Estimate (#)	Stock Trend	Potential Biological Removal (# per year)	BSAI Estimated Groundfish Trawl Incidental Mortality (# per year)	GOA Estimated Groundfish Trawl Incidental Mortality (# per year)
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2001 Assessment

12,648	Decrease	379	2.2 (Unk.) <sup>a</sup>	—
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2007 Assessment				
20,109	Decrease <b>b</b>	603	1.3 (Unk.) <b>a, c</b>	—
<p>Source: Angliss <i>et al.</i> 2001, Angliss and Outlaw 2007; a long dash (—) indicates not applicable.</p> <p><sup>a</sup> It is not known with certainty whether incidental mortalities in the commercial fisheries are less than 10 percent of PBR because of the absence of observer placements in several salmon gillnet fisheries known to interact with this stock.</p> <p><sup>b</sup> Recent trends in abundance for this stock are difficult to evaluate due to recolonization of habitat by northern fur seals and the presence of a sympatric species, spotted seals, which may overlap the range of harbor seals but cannot be identified as a different species using aerial surveys.</p> <p><sup>c</sup> Harbor seal incidental mortality during the most recent five-year period caused by the cod and flatfish bottom trawl fisheries.</p>				
<p>Table 3. Gulf of Alaska harbor seal minimum population estimates, stock trends, PBRs, and incidental mortalities in the BSAI and GOA trawl fisheries, 2001 and 2007.</p>				
Min. Pop. Estimate (#)	Stock Trend	Potential Biological Removal (# per year)	BSAI Estimated Groundfish Trawl Incidental Mortality (# per year)	GOA Estimated Groundfish Trawl Incidental Mortality (# per year)
2001 Assessment				
28,917	Stable	868	0.0	0.4 (Unk.) <b>a</b>
2007 Assessment				
44,453	Stable <b>b</b>	1,334	0.0	0.0
<p>Source: Angliss <i>et al.</i> 2001, Angliss and Outlaw 2007.</p> <p><sup>a</sup> It is not known with certainty whether incidental mortalities in the commercial fisheries are less than 10 percent of PBR because of the absence of observer placements in several salmon gillnet fisheries known to interact with this stock.</p> <p><sup>b</sup> There was a steady decrease in the GOA harbor seal population during the 1970s through the 1990s. Despite some positive signs of growth, the overall GOA stock likely remains small compared to its size in the 1970s and 1980s.</p>				
<p><b>Kittiwakes and Murres</b></p> <p>The US Fish and Wildlife Service (FWS) compiles data collected annually for selected species of marine birds at breeding colonies on the far-flung Alaska Maritime National Wildlife Refuge and at other areas in Alaska to monitor the condition of the marine ecosystem and to evaluate the conservation status of species under the trust of the FWS. This progress report updates that for 2008 by reviewing information on breeding status, population trends and diets of kittiwakes and murres in Alaska from 2004. The strategy for colony monitoring includes estimating timing of nesting events, rates of reproductive success (productivity, e.g., chicks fledged per nest), population trends and diet composition of representative species of various foraging guilds (e.g., offshore diving fish-feeders, offshore surface-feeding fish-feeders, diving plankton-feeders) at geographically-dispersed breeding sites. Kittiwakes and murres are categorized as surface fish feeders (Dragoo <i>et al.</i> 2007).</p> <p>For the Gulf of Alaska (GOA), black-legged kittiwake colonies within Price William Sound and on Middleton Island are the largest and the colony within Chiniak Bay on Kodiak Island is the closest to fishing activities (red-legged kittiwakes are not present in the GOA in large</p>				

	<p>numbers). For most GOA sites productivity in 2004 was below average, although productivity at Middleton Island has been very low for 20 years and the colony has declined at about 7.5 percent per year for nearly 20 consecutive years. In contrast, colonies within PWS and on Middleton Island appear stable. No information could be found concerning the likely cause of the decline in numbers of black-legged kittiwakes at Middleton Island. Being surface fish feeders, most kittiwake prey are included under the management category forage fish. Abundance trends for these species based on GOA survey catches are shown in Boldt (2006, pp. 173-4).</p> <p>Common and thick-billed murre colonies proximate to pollock fishing locations in the GOA include those within Puale Bay and on Chowiet Island. Productivity of common murres was not assessed at these locations in 2004 but for thick-billed murres productivity was below average at Chowiet Island. Estimated numbers for these species together have been stable at Chowiet Island 1975-2004 and within Puale Bay 1990-2002.</p>
<b>Observations</b>	<p>The extensive program of research on Northern fur seal was alluded to earlier (see Conditions 6 and 7, above). NMFS has also devoted considerable effort to better understanding the population structure and trends in abundance of harbor seals in Alaska. Although data are still limited, there is some evidence of large declines in abundance of harbor seals in the Aleutian Islands and in Glacier Bay. However, other previously declining areas, such as Prince William Sound, have increased in abundance.</p> <p>The US Fish and Wildlife Service (FWS) compiles data collected annually for seabirds at breeding colonies throughout Alaska to monitor the condition of the marine ecosystem and to evaluate the conservation status of species. Their most recent report (Dragoo <i>et al.</i> 2007) covers the period through 2004. Populations of fish feeders (fulmars, cormorants, gulls, kittiwakes, murres, guillemots, rhinoceros auklets, puffins) exhibited stable populations in 36 of 69 cases. There was a significant upward trend in 14 cases and significant downward trend in 19 cases, but no geographic patterns were apparent with regard to population trends of fish eating seabirds.</p> <p>In addition to these monitoring studies, data from these species are included in ecosystem model of the Bering Sea and Aleutian Islands (e.g., Aydin <i>et al.</i> 2007). These models are used to evaluate the effects of fishing on a wide range of dependent species, including NFS, harbor seals and a variety of seabirds. There is also the development of a forage fish model (FEAST) which can be used to make predictions about food to infer marine mammal and seabird distributions.</p>
<b>Conclusion</b>	<p>The surveillance team is satisfied with the high level of commitment to better understand the effects of the pollock fishery and pollock abundance on dependent species other than Stellar sea lion. Although further progress can be expected, current knowledge is sufficient to close this condition.</p> <p>On the basis of the above commentary the score associated with the Performance Indicator 3.3 is adjusted as follows:</p> <p><b>80 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Alterations to fishing to recover and rebuild depleted species are based on incomplete data and understanding, but take a precautionary approach to reduce impacts.</li> </ul> <p><b>100 Scoring Guidepost</b></p> <ul style="list-style-type: none"> <li>• Alterations to fishing to recover and rebuild depleted species are based on a sound understanding of functional relationships between the impacted population and the fishery. This includes understanding predator-prey dynamics, species interactions, prey abundance/spatial distribution, foraging behaviour, food web requirements and habitat needs.</li> </ul> <p>The score allocated to this Performance Indicator is now raised to 85.</p>

<b>12</b>	<b>Condition of Certification 12.</b> The fishery is managed and conducted in a manner that respects domestic law [ <i>Relates to MSC Criterion 3.16</i> ]
<b>Conclusion of Surveillance Report 1</b>	The requirements of this condition have been met and this Condition is closed. Ongoing legal compliance of the certified fishery will be monitored under general Sections of future surveillance reports.
<b>Observations</b>	There is no new information indicating a decrease in compliance with U.S. law in the pollock fishery.

<b>13</b>	<b>Condition of Certification 13.</b> The management system solicits and takes account of relevant information [ <i>Relates to MSC Criterion 3.2</i> ].
<b>Conclusion of Surveillance Report 2</b>	The requirements of this condition have been met and this Condition is closed and the outcomes of ongoing associated work will be reviewed as a function of annual surveillance audits.
<b>Conclusion of Surveillance Report 3</b>	<p>There is evidence of Alaska Native consultation and research on traditional ecological knowledge in several areas. NPFMC consultation with Alaska Native communities is a part of standard Council processes. Several new actions on the part of the Council and the NMFS are designed to formalize Alaska Native consultation, expand outreach to stakeholders including Alaska Native communities, and increase research on traditional ecological knowledge. The Pollock Conservation Cooperative Research Center has also funded research in traditional ecological knowledge, as has the North Pacific Research Board. The incorporation of traditional ecological knowledge into the scientific assessment process is still in its infancy, but discussions about methods and options for incorporation are ongoing.</p> <p>The consultation with and use of traditional ecological knowledge of the Alaska Native community by the management system meets the standard for soliciting and taking account of relevant information, and the condition remains closed.</p>
<b>Observations</b>	Since the 2008 surveillance report the NPFMC has been engaged in additional activities and rural coastal community outreach. The Council has established the Rural Outreach Committee for the purpose of increasing Alaska Native and community consultation and will appoint members and provide direction to this Committee at its June 2009 meeting. Formation of this committee is consistent with action #7 in the Council's Groundfish Policy Workplan (NPFMC 2008b). One task of the Committee will be to develop a broader plan for future outreach efforts as well as provide direction on specific outreach projects. Outreach activities are coordinated with the Federal government (NMFS), which has a legal obligation to consult with tribes or ANCSA corporations.
<b>Conclusion</b>	The NPFMC is expanding its outreach activities with Alaska Natives and rural communities with specific implementation plans.

<b>14</b>	<b>Condition of Certification 14.</b> The management system provides for internal assessment and review [Relates to MSC Criterion 3.3]
<b>Conclusion of Surveillance Report 1</b>	An extensive scientific review process is in place, conducted through both internal and external means. The existing review process constitutes the “periodic, candid and authoritative internal review process for pollock fishery management procedures and outcomes” required by the condition. The requirement of this condition is therefore considered to be met and the Condition closed.

<b>15</b>	<b>Any complaints against the certified operation; recorded, reviewed and actioned</b>
	<p>The certified operation considered here is the following signatories to the APA MSC certification programme:</p> <p>Alaska Ocean Seafood  American Seafoods Co.  Arctic Storm, Inc.  Arctic Fjord, Inc.  Glacier Fish Co.  Golden Alaska Seafoods  Highland Light Seafoods  International Seafoods  Ocean Peace, Inc.  Pacific Seafood Group  Starbound LLC.  Supreme Alaska Seafoods  Trident Seafoods Corp.  Icicle Seafoods  Peter Pan Seafoods  Westward Seafoods  Premier Pacific Seafoods  Alyeska Seafoods Co.  UniSea</p> <p>There were no reported incidents of any complaints against the APA member companies or the non-APA Alaska pollock producers relating to the scope of MSC certification.</p>

<b>16</b>	<b>Any relevant changes to legislation or management regime.</b>
	There were no known substantive and relevant changes in legislation or management within the annual cycle of this surveillance audit.

<b>17</b>	<b>Overall Conclusions</b>
	<p>The overall management of the fishery continues to at least the level as during the main assessment.</p> <p>APA and/or NMFS have taken appropriate measures to address the conditions of certification raised during the MSC certification assessment. This can be summarised as follows:</p> <ol style="list-style-type: none"> <li>1. Conditions where requirements are deemed to have been fully met and the condition closed: <ul style="list-style-type: none"> <li>• Conditions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 (i.e. all)</li> </ul> </li> </ol> <p>Some comments and recommendations have been made by the assessment team to assist in further development of measures, if needed with respect to recertification. .</p>

	It is concluded that MSC Certification should continue
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**Information Sources:****Meetings**

1. 4<sup>th</sup> May 2009. Ed Richardson and Paul MacGregor: At-Sea Processors Association.
2. 4<sup>th</sup> and 6<sup>th</sup> May 2009. Teresa A'mar, Kerim Aydin, Steve Barbeaux, Peter Boveng, Martin Dorn, Brian Fadely, Shannon Fitzgerald, Sarah Gaichas, Anne Hollowed, Jim Ianelli, Bill Karp, Pat Livingston, Craig Rose and Stephani Zador: NOAA Fisheries; Ed Richardson: At-Sea Processors.
3. 6<sup>th</sup> May 2009. Jon Rowley: Jon Rowley and Associates; Becca Robbins Gisclair: Yukon River Drainage Fisheries Association.
4. 7<sup>th</sup> May 2009, by phone: Jane DiCosimo, Chris Oliver, Diana Stram, Bill Wilson and David Witherell, North Pacific Fishery Management Council; Present- Ed Richardson and Paul MacGregor: At-Sea Processors Association.
5. 7<sup>th</sup> May 2009. Karl Haflinger: Sea State, Inc; Seamus Melly: Swan Net USA; Ed Richardson and Paul MacGregor: At-Sea Processors Association.
6. 7<sup>th</sup> May 2009. Greg Ruggerone: Natural Resources Consultants, Inc. Paul MacGregor: At-Sea Processors Association.
7. 8<sup>th</sup> May 2009, by phone. Bubba Cook and Bruce Robson: World Wildlife Fund.
8. 9<sup>th</sup> May 2009. Ed Richardson and Paul MacGregor: At-Sea Processors Association.

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