AGENDA C-3(c)
DECEMBER 2008

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

DATE: December 1, 2008

SUBJECT: BS and AI Pacific Cod Allocation Split

ESTIMATED TIME
8 HOURS
(all C-3 items)

ACTION REQUIRED

Review discussion paper and take action as necessary

BACKGROUND

At its October 2008 meeting, the Council received a report from the SSC in which the latter recommended separating the combined BSAI Pacific cod specifications into BS and AI specifications. The SSC recommendation was based on a summary of biological information prepared by the Alaska Fisheries Science Center and reviewed by the SSC in October 2008 (**Item C-3(c)(1)**).

In recognition of the challenging management issues associated with apportioning the BSAI Pacific cod sector allocations between areas, the Council tasked staff to update a February 2008 discussion paper on the apportioning of BSAI Pacific cod sector allocation between BS and AI areas, for review at this Council meeting. The discussion paper is attached as **Item C-3(c)(2).** Note that the discussion paper addresses the apportionment of BSAI Pacific cod sector allocations between the BS and AI subareas, not the biological implications of the splitting the TAC between the two areas. The discussion paper reviews several alternatives for allocation, as follows:

- **Alternative 1** is status quo.

- **Alternative 2** would issue sectors their overall amount of BSAI Pacific cod allocation that could be harvested anywhere in the BSAI. This alternative provides the greatest flexibility for sectors and may be the simplest alternative for in-season management to monitor. However, the alternative could cause sectors to race for Pacific cod in the subarea that they expect to close first. Additionally, NMFS has expressed some concern with this alternative relative to the 2001 Biological Opinion for Steller sea lion management. Because Alternative 2 does not establish sector allocations in each subarea, there are no gear specific seasonal apportionments by subarea.

- **Alternative 3** would allocate sectors the same percentage of the BS subarea and AI subarea TACs, as determined by the BSAI sector allocations implemented under Amendment 85. In effect, each sector would be allowed 85% of its BSAI Pacific cod allocation in the BS and 15% of its BSAI Pacific cod allocation in the AI, using the stock assessment apportionments between areas. In general, Alternative 3 is likely to be the most disruptive to the fleet compared to Alternatives 2 and 4. While it may mitigate disproportionate impacts that result from TAC fluctuations, it may force vessels to fish in areas in which they have very limited historical participation and do not want to fish. This alternative also reflects the default scenario under the current regulations, should the Council choose to take no action.

- **Alternative 4** would define the sector allocations for each subarea based on the relative percentages of Pacific cod that were harvested by the sectors during an identified fishing period. Thus, the overall sector splits determined at the combined BSAI level under Amendment 85 would remain in place, and the sector allocations would then be calculated for each subarea. This alternative would divide the AI Interim TAC among the sectors based upon each sector's relative historic harvest in the AI. The remainder of each sector's overall BSAI allocation is allocated in the BS. Overall, this alternative is likely more disruptive to the fleet compared to Alternative 2, but less disruptive than Alternative 3. This alternative, much like Alternative 3, would apportion Pacific cod into subarea and seasonal allocations thus reducing the flexibility of the fleet. However, all options under Alternative 4 are based on a sector's AI harvest, so would be less disruptive to the fleet.

STELLER SEA LION ISSUES

In apportioning BSAI Pacific cod sector allocations between the BS and AI areas, the current management regime could change thus requiring consultation with NMFS Protected Resource Division (PR). The current Biological Opinion of the effects on Steller sea lions of the groundfish fisheries offshore Alaska was on those fisheries as prosecuted at the time of the Biological Opinion (2001 and its 2003 Supplement). A split in the BSAI Pacific cod sector allocations between BS and AI areas would be considered a change in the action upon which PR, the Council, and NMFS previously consulted, and thus PR would need to be consulted again. Should the TAC be split between the BS and AI, it is likely that PR would need to provide guidance as to the seasonal allocations of Pacific cod by gear type and individual (BS and AI) area. One cannot assume that the current seasonal allocations by gear type for the BSAI combined would satisfy the conditions in the existing Biological Opinion.

Complicating this issue is that NMFS PR is currently developing a new Biological Opinion on the effects of the current Alaska groundfish fisheries on Steller sea lions. The preliminary draft Biological Opinion is schedule for release on October 2009. Given that a new Biological Opinion is being developed, which may come to different conclusions in terms of jeopardy or necessary mitigation measures in order to prevent jeopardy, then the existing (2001 and 2003 Supplement) Biological Opinion, makes it very difficult to simultaneously propose changes to the way in which Pacific cod is managed. The Council could develop the analysis to establish separate BS and AI sector allocations at the same time the Biological Opinion is being developed (2009), but the Council would not know for certain the bounds within which the proposed action should be developed until after the Biological Opinion is released. The risk is that the Council may put significant effort into developing a preferred alternative which does not meet the conditions outlined in the new Biological Opinion. This issue would most likely apply to any changes in seasonal distribution of catch in the AI, if that differs from the status quo.

Summary of biological information regarding differences between Pacific cod in the eastern Bering Sea and Aleutian Islands
September 2008

Olav A. Ormseth, Mike Canino, Liz Conners, Sandi Neidetcher, Peter Munro, Sarah Gaichas and Kerim Aydin (Alaska Fisheries Science Center); Doug Kinzey (University of Washington)

Executive summary

The NPFMC is considering action that would treat the eastern Bering Sea and Aleutian Islands separately for the purposes of Pacific cod management. This report is intended to summarize existing biological information on Pacific cod that may be useful in evaluating this action. The following conclusions may be useful and are described in greater detail in the report:

1) There is highly significant genetic isolation by distance in the Pacific cod stocks of North America (i.e. genetic differences among individuals increase with geographic distance; Fig. 1-2).This result, as well as several different genetic comparisons among regional groupings, suggest that Pacific cod stocks in the Aleutian Islands archipelago are distinct from those along the contiguous Alaska Peninsula.
2) In 2005, length at age was significantly higher in the AI than in the EBS for both female and male cod (Table 2-1, Figs. 2-2 & 2-3). This difference is present at all ages.
3) Commercial trawls in the AI catch bigger female and male cod than do trawls in the EBS (Figs. 3-1, 3-2 & 3-3). From 2004 to 2006, the mode for cod in the EBS occurred at 65-70 cm, while the mode for females in the AI occurred at 80-85 cm. Fish smaller than 50 cm were evident in EBS trawls, but were rare in the AI.
4) Estimates of age composition suggest that commercial trawls in the AI also catch older fish (Fig. 4-1). In particular, cod older than age 8 are largely absent from EBS trawls, while 8-11 year old fish were common in AI trawls. Age estimates were obtained by applying the growth models used in (2) above to the size composition in (3) above.
5) Length-weight relationships did not differ between the AI and EBS in 2005 (Figs. 5-1 & 5-2).
6) Length-specific gonad weight, a proxy for reproductive potential, was equal between the EBS and AI in 2005 (Fig. 6-1A). Length-specific fecundity (Fig. 6-1B) and egg size were significantly different between the EBS and AI in 2005, but the differences were small and may not be biologically relevant.
7) The fatty acid composition of egg polar lipids differed between the EBS and AI (Figs. 7-1 &7-2). Similar differences in other fish species have been used as an indicator of genetic differentiation and stock structure.
8) Cod appear to spawn in several locations in the AI and throughout the EBS (Fig. 8-1).
9) Tagged cod have moved between the EBS and AI, but such movements are limited relative to observed cod movement within the EBS and between the EBS and the western GOA.
10) Fishery exploitation rates in the AI are higher than in the EBS (22% and 17%, respectively). A recently-developed AI-specific assessment model for Pacific cod suggests that cod in the AI have a different population trajectory than cod in the EBS (Figs. 10-1 & 10-2).

11) The density (t/km2) of Pacific cod is higher in the AI than in the EBS (Fig. 11-1). The diet composition of cod is different between the AI and EBS (Fig. 5-1), based on summer survey data from the early 1990s. Simulations of Pacific cod ecological relationships suggest that fishing impacts to the ecosystem mediated by Pacific cod are higher in the AI (Fig. 11-4).
12) Several research projects that will study Pacific cod genetics and movement have recently been funded and these data will be available over the next 2-3 years.

Introduction

Pacific cod (*Gadus macrocephalus*) in Alaska are currently managed as two stocks: a Gulf of Alaska (GOA) stock and a Bering Sea/ Aleutian Islands (BSAI) stock. The North Pacific Fisheries Management Council (NPFMC) assigns a total allowable catch (TAC) of Pacific cod for the entire BSAI stock that is subsequently assigned to various gear and vessel sectors. The NPFMC is considering a proposal to further divide cod catches by assigning separate cod TACs to the Eastern Bering Sea (EBS) and Aleutian Islands (AI) subareas. The basis for this proposal is the possibility that AI cod form an independent stock or stocks within the BSAI area, and that separate TACs for EBS and AI cod may provide for more effective management.

The purpose of this paper is to synthesize the biological information currently available for cod in the EBS and AI subareas. Much of this information is recent and has not yet been published in the peer-reviewed literature. This report considers the following issues:

1) Population genetics
2) Length at age
3) Size composition
4) Estimated age composition
5) Length-weight relationships
6) Reproductive potential
7) Egg fatty-acid profiles
8) Spawning locations
9) Movement and migration
10) Population dynamics
11) Ecosystem effects
12) Ongoing and future research

(1) Population genetics

Methods

Samples were collected from large spawning and pre-spawning aggregates of Pacific cod in eight locations across the northeastern Pacific Ocean from January-March (Fig. 1-1). Replicate samples were taken at 2-year intervals at two locations, Unimak Pass and Kodiak Island, Alaska Two samples from the central Aleutian Islands region in 2006, Adak (AD) and Atka (AT), were in relatively close proximity (180 and 275 km, respectively) to one sample collected during a

trawl survey in 2005, Aleutian Islands (AI). Genomic DNA was extracted from pectoral fin tissue from approximately 90 individuals per sample and was screened for variation at 11 microsatellite markers.

Results

There was a highly significant pattern ($r^2 = 0.83$) of genetic isolation by distance among coastal samples across the North American range of Pacific cod, including samples taken within Alaska (Fig. 1-2). There was no genetic differentiation between temporal replicate samples taken at Unimak Pass and Kodiak Island. Exact tests of genetic differentiation (Table 1-1) showed that Kodiak Is. was significantly differentiated from the central Aleutian Islands. Unimak Pass also was significantly differentiated from the central Aleutian Is. prior to correction for multiple pairwise tests. Kodiak Island and Unimak Pass were not significantly differentiated from each other.

	Aleutian Islands	Unimak Pass	Kodiak Island
Aleutian Islands	---	**0.0050**	**0.0000**
Unimak Pass	0.0138*	---	0.3402
Kodiak Island	**<0.0001**	0.5213	---

Table 1-1. Probability (*P*) values from exact tests of genetic (above diagonal) and genotypic (below diagonal) differentiation between sample pairs in Alaska. Bolded values indicate sample pairs significantly differentiated following sequential Bonferonni correction for 21 multiple tests (initial $\alpha = 0.0024$). * significant prior to sequential correction.

Multilocus estimates of genetic divergence, F_{ST}, between sample pairs (Table 1-2) were significant between Kodiak Island and the central Aleutian Islands and significant between Unimak Pass and the central Aleutian Is. before correction for multiple tests. Estimates of F_{ST} were not significant between Kodiak Island and Unimak Pass.

	Aleutian Islands	Unimak Pass	Kodiak Island
Aleutian Islands	---	0.0012*	**0.0023**
Unimak Pass	0.0007	---	0.0004
Kodiak Island	-0.0006	0.0025	---

Table 1-2. Estimates of F_{ST} (above diagonal) and R_{ST} (below diagonal) between sample pairs in Alaska. Bolded F_{ST} values are significant following sequential Bonferroni correction for 21 multiple tests (initial $\alpha = 0.0024$); * significant prior to sequential correction.

Within Alaska, an analysis of molecular variance (AMOVA) for regional groupings of samples showed that pooling the Unimak Pass and Kodiak Is. samples as a group compared to the Aleutian Islands resulted in the highest overall F_{ST} value, no significant between-sample variance component within regional groups, and a significant between-group variance. In contrast, pooling Unimak Pass and central Aleutian Islands samples as a group resulted in a significant between-sample variance component within the group and an insignificant between-group variance when compared with Kodiak Island. Overall, the results indicate that Pacific cod stocks in the Aleutian Islands archipelago are distinct from those along the contiguous Alaska Peninsula.

(2) Length at age

Methods

In January-March 2005, scientists from the Alaska Fisheries Science Center (AFSC) collected Pacific cod samples in the central and western AI and north of Unimak Island in the EBS (Fig. 2-1). Samples in the AI were collected by an AFSC scientist conducting research aboard a factory trawler during the course of normal commercial fishing operations. EBS samples were collected aboard chartered crab vessels during two pot surveys conducted by the Fisheries Interaction Team (FIT) at the AFSC. Because the collections were part of an ongoing study of cod reproduction, sexually mature females formed a greater part of the datasets in both areas (Table 2-1). Cod were selected randomly from the catch according to a schedule of length bins. Length was measured, and body and ovary (gonad) weight were measured using a motion-compensated scale. Otoliths were removed for age analysis, which was conducted by the Age and Growth laboratory at the AFSC.

Length at age was modeled using the Schnute parameterization of the von Bertalanffy growth model (Quinn and Deriso 1999):

$$Y(t) = \left\{ y_1 + (y_2 - y_1)\frac{1-\exp[-\kappa(t-\tau_1)]}{1-\exp[-\kappa(\tau_2-\tau_1)]} \right\}$$

where $Y(t)$ is the length at age t, τ_1 and τ_2 are the youngest and oldest ages in the dataset respectively, and y_1, y_2, and κ are constants. Males and females were treated separately and statistical differences between the AI and EBS areas were analyzed using likelihood ratio tests (Quinn and Deriso 1999).

Results

Length at age was greater in the AI subarea for female and male cod (Table 2-1; Figs. 2-2 & 2-3). This difference is present at all ages.

	Females			**Males**	
	AI	EBS		AI	EBS
y_1	43.26	37.79	y_1	48.43	46.45
y_2	116.06	110.57	y_2	109.26	95.97
κ	0.079	0.039	κ	0.099	0.092
τ_1	3	3	τ_1	4	4
τ_2	12	12	τ_2	11	11
N	256	305	N	66	153
X^2 statistic	199.97		X^2 statistic	68.00	
p-value	<0.0001		p-value	<0.0001	

Table 2-1. Growth model parameters and test results for male and female Pacific cod from the Aleutian Islands (AI) and Eastern Bering Sea (EBS).

(3) Size composition

Methods

The size composition of cod in the different regions was examined using data collected by the AFSC North Pacific Observer Program. Observers routinely collect length frequency data on target species and major components of the catch for selected hauls. From the observer database, we identified all of the observed hauls for which cod length frequency data were collected during the January-March cod 'A' Season in 2004, 2005, and 2006. Because pot and longline gear are known to be size-selective for larger fish, only hauls using bottom trawl gear were selected. Data from NMFS statistical area 509 (northeast of Unimak Pass) were selected to represent EBS cod. Data from each of the three AI statistical areas (eastern AI 541, central AI 542, western AI 543) were also selected.

Results

In each of the three years, there were differences in length frequency between the EBS and AI areas (Figs. 3-1, 3-2, 3-3). In each year, the mode of area 509 frequencies was between 65 and 70 cm, with a sharp drop-off above 75 cm and relatively few fish longer than 90 cm. In 2005 and 2006, there were clear secondary peaks at lengths of 35-40 and 45-50 cm, perhaps representing younger year classes. Length frequencies in the eastern AI (area 541) had modes in the 80-85 cm range, with smaller numbers of fish from 50-70 cm and a larger fraction in the 90-100 cm size range than in the EBS. Length frequencies for the central and western AI (areas 542 and 543) were similar to each other but very distinct from the EBS, with few fish under 70 cm and sizeable fractions of fish 100 cm or more.

The results show different size distributions in catches from the EBS and the AI. Because only the largest catcher-processors harvest fish in the central and western AI, it is possible that differences in gear selectivity may affect these results. Length frequencies were examined using data only from vessels classified as catcher-processors (all over 100 ft), and patterns were similar to those in the figures presented.

(4) Estimated age composition

Methods

Section 2 of this report demonstrated significant differences in length at age among EBS and AI cod. To determine whether this growth difference alone accounted for the difference in observed length frequencies, we combined 2005 length-frequency data from section 3 with region- and sex-specific length-age curves to estimate age composition. Length-age curves for cod collected from FIT studies in the EBS in March 2005 were used to predict ages for fish from statistical area 509. Length-age curves for cod from the 2005 collection in the AI were used to predict ages for pooled length frequency data from statistical areas 542 and 542.

Results

For both sexes the estimated age frequencies differ between the EBS and the AI (Fig. 4-1). Both regions show relatively low numbers of 2 and 3 year old fish in the catch, probably due to low selectivity of these ages by trawl gear. The majority of the EBS catch is 5-8 year olds of both

sexes. Numbers of age 9 and older cod are low for both males and females in the EBS. Catches in the AI are dominated by 6-10 year olds, with a substantial fraction of females 9-11 years old. In both regions the largest specimens have an estimated age of approximately 14 years.

While variability in length at age will result in some uncertainty in these age estimates, there does appear to be a difference in age composition between the two regions. For both sexes there is a larger proportion of older fish in the AI. The relative absence of younger fish in the AI may reflect different year-class structure or may result from the fact that commercial trawl grounds in the AI are further from inshore shallows and nursery grounds. The dominance of AI samples by older fish is also consistent with a pattern where the EBS would serve as a nursery ground for both subareas, with fish migrating to the AI at some stage of their life cycle.

(5) Length-weight relationships

Methods

The cod samples used in this analysis are identical to those used in (2) above. Somatic weight, determined by subtracting the weight of ovaries and stomach contents from total body weight, was used in the analysis of length-weight relationships. Weight and ovary weight were modeled using power curves of the form $y=\alpha x^{\beta}$ where y is weight or ovary weight, x is length, and α and β are constants. Males and females were treated separately and statistical differences between the AI and EBS areas were analyzed using likelihood ratio tests (Quinn and Deriso 1999).

Results

No statistically significant differences were observed in the length-weight relationships for male and female cod or in the length-ovary weight relationship for female cod (Table 5-1; Figs. 5-1, 5-2).

length-weight, females			length-weight, males		
	AI	EBS		AI	EBS
N	69	106	N	257	307
X^2 statistic	5.35		X^2 statistic	1.20	
p-value	0.15		p-value	0.75	

Table 5-1. Sample size and test statistics for length-weight relationships in female and male Pacific cod.

(6) Reproductive potential

Methods

Ovary samples were collected for a subset of the females used in the analyses in (2) and (5) above. Ovaries were weighed to the nearest gram on a motion-compensated specimen scale frozen at -20°C for subsequent analysis. Fecundity was determined using the gravimetric method, and egg samples were freeze-dried to a constant weight for determination of individual egg dry weight (used as a measure of egg size).

Results

Total gonad (ovary) weight was used as a proxy for reproductive potential, which comprises fecundity and egg size, for samples collected from the AI (N = 137) and EBS (N = 44) in 2005 (see Fig. 2-1 for sampling locations). Reproductive potential increased approximately with the cube of the length, and this relationship did not differ between the AI and EBS (Figure 6-1A; $F = 0.71$, $p = 0.4918$). However, females from the two areas achieved equivalent reproductive potential through different means. Fecundity at length was slightly greater in the EBS (Figure 6-1B; $F = 8.50$, $p = 0.0003$), while average egg size (as measured by dry weight) was slightly greater in the AI (AI = 0.103 ± 0.001 mg, EBS = 0.097 ± 0.002 mg; $F = 10.87$, $p = 0.0012$). While differences in fecundity and egg size were significant, they were quite small and may not be biologically relevant.

(7) Egg fatty-acid profiles

Rationale

The composition of fatty acids (FA) in fish egg lipids may affect hatching success and larval survival. In addition, fatty acid composition has been used to discriminate among genetically distinct stocks of several marine fish species as well as lobsters (Castell et al. 1994, Joensen and Grahl-Nielsen 2004, Joensen et al. 2000, Pickova et al. 1997). While fatty acid composition of lipids is influenced by diet, this appears to occur mainly in the neutral lipids, which are used as a source of energy. The fatty acid composition of polar lipids, which are used primarily as structural components and hormone precursors, is thought to be highly regulated and less influenced by diet (Pickova et al. 1997). As a result, differences in polar-lipid fatty acid composition may reflect local adaptation and genetic differentiation among stocks.

Methods

This analysis compared the fatty acid composition of eggs collected from the EBS in 2004 (N = 7) and the AI in 2005 (N= 21). All eggs were collected from females in spawning condition and immediately frozen in liquid nitrogen. Fatty acid analysis of the polar lipids was performed by a commercial laboratory. Principal component analysis (PCA) was used to separate individual females according to 1) a full set of 23 fatty acids and 2) a subset of 8 fatty acids that have been shown to affect egg quality.

Results

In both cases, there was a clear separation between the eggs of females from the AI and EBS, with the exception of one sample that was intermediate to the two main groups (Figure 7-1). This analysis of area effects on FA composition was complicated by maternal length effects on several fatty acids and size differences of sampled females from the AI and EBS. The fractions of three fatty acids in the polar lipids were related to maternal total length: linoleic acid ($R^2 = 0.63$, $p = 0.0001$), α-linolenic acid ($R^2 = 0.38$, $p = 0.0051$), and arachidonic acid (AA; $R^2 = 0.26$, $p = 0.0242$). Regression analysis was conducted for only the eggs from the AI (Figure 7-2; only the results for AA are shown). Because the female cod from the EBS were smaller than those in the AI, maternal length effects could confound the analysis of area effects. For example, EBS eggs have higher AA content, smaller females have higher AA content, and the EBS females we collected were on average smaller, so it is possible that area-related variability in AA is the result

of area-related size differences. In addition, neither the AI or the EBS sample sets includes the full size spectrum of female cod in each area.

Despite age and size differences between the EBS and AI and the incomplete representation of EBS and AI cod populations, there are several reasons why the area differences in FA composition are likely due to either diet or adaptation and not maternal size. The best evidence for this conclusion is the separation of samples by the various PCAs. Separation into area groups is very distinct, and despite overlap in female size between the two areas (Figure 7-2) there is no overlap between the two areas in the PCA. The range of size-related variability in AA within the AI samples is also much smaller than the difference in AA between areas. Finally, several of the FAs that differed between areas (e.g. oleic acid) were not related to maternal length.

(8) Spawning locations

Very little is known about preferred spawning habitat for Pacific cod and about the spatial distribution of cod spawning in the BSAI. Spawning is known to occur in the southeast Bering Sea near Unimak Pass, and areas of high cod density (indicative of spawning aggregations) have been observed in the AI. In order to better document cod spawning locations, the FIT and the North Pacific Observer Program are conducting a special project using fishery observers to classify and record the gonad maturity of cod from selected hauls. This project is providing data regarding the date and location of hauls containing fish in ripe or near-ripe condition, which can be used to map putative spawning areas. Preliminary results suggest that cod spawn in several areas of the AI, as well as throughout the EBS (Fig. 8-1).

(9) Movement and migration

As part of field studies conducted in 2002-2004, FIT scientists tagged and released cod in the southeast Bering Sea between Cape Sarichef and Amak Island. These releases were primarily intended to develop methodology for spaghetti tagging of Pacific cod caught with pots and to gain some qualitative description of cod movement during and after the spawning season. The majority of the tags were released in February 2003. Tag recovery has been solely through commercial fisheries.

Out of 5935 spaghetti tags released in the Bering Sea, 2331 (39%) have been recovered as of December 2005. Of the recovered tags, the majority of the recoveries were from the Bering Sea. A total of 148 tags were recovered in the western GOA, indicating some movement of fish through Unimak Pass. Only two tags from the FIT Bering Sea releases were recovered in the AI. These results are consistent with an earlier study that demonstrated little movement of EBS cod to the AI (Shimada and Kimura 1994).

These data are difficult to interpret because the releases were not designed to look for movement between the regions. The small number of recoveries in the AI suggests that movement from the Bering Sea to the AI might be rare, but this may also be an artifact of the relatively small level of

cod fishing effort in the AI. Fish released in the EBS were also adults; no information is available on movement of juvenile cod.

(10) Population dynamics

Unequal exploitation rates
An unintentional effect of the BSAI wide Pacific cod TAC was a difference in exploitation rates for EBS and AI cod in 2007. Catches reported in the SAFE (Thompson et al. 2007) were 136,430 t in the EBS and 33,724 t in the AI and were complete through early October 2007. The assessment-estimated exploitable biomass of cod was 806,400 t in the EBS, and the AI estimate of exploitable biomass of 153,600 t was estimated in the assessment based on the assumption that the AI exploitable biomass should reflect the ratio of AI survey biomass to EBS survey biomass; 0.16. If this is correct, then the exploitation rate in the AI was 33,724 t / 153,600 t or 22% in 2007, while the EBS exploitation rate was 136,430 t / 806,400 t or 17% in 2007. The overall exploitation rate for the BSAI was 18% based on these numbers; therefore, statistics based on the BSAI are more representative of exploitation rates in the EBS than in the AI.

Different population trajectories
The BSAI Pacific cod SAFE models the EBS portion of the population only, and until recently, there was no separate population model for the AI portion of the population. Kinzey and Punt (in review) have developed an AI cod population model using AI data and an assessment framework developed at the AFSC (AMAK, developed by J. Ianelli). There are differences in the population trajectories estimated for each area. For example, the EBS cod stock was estimated to have been at a historic low in 1976, to have increased rapidly to a historic high in 1983-1985, and to have declined to an intermediate biomass and fluctuated within that range between the 1990s and 2000s (Figure 10-1; Thompson et al. 2007). In contrast, the AI cod stock was estimated to have been near a historic high in 1976, and has undergone a general decline since then with the exception of a small peak in the early 1990's (Figure 10-2; Kinzey and Punt in review). All AI model structures (both standard single species and experimental models including predation) suggest a decline in AI cod spawning biomass from the mid-1990's to the present, while the EBS model suggests a slight increase in spawning biomass from 1998-2003 with a decline since then.

(11) Ecosystem effects

The following information is summarized from the 2007 BSAI Pacific cod SAFE, and is included here so that this report can be considered separately. The food web relationships of cod are different between the EBS and AI ecosystems, both due to spatial distribution and diet differences. Because the AI has a much smaller area of shelf relative to the EBS, the smaller survey biomass estimate of cod in this area translates into a higher density in tons per square kilometer relative to the density in the EBS (Figure 11-1, left panel). Cod have diverse diets in both ecosystems, but with important differences (Figure 11-2). Pollock account for 25% of cod diet in the EBS. Commercially important crab species such as snow crab (C. opilio) and tanner crab (C. bairdi) make up 9% of cod diets in the EBS, but less than 3% in the AI, reflecting the stronger benthic energy flow in the EBS. In contrast, pollock comprise less than 5% of AI cod

diet, while Atka mackerel account for 15%. Squids make up over 6% of cod diets in the AI, but are very small proportions of diets in the EBS, reflecting the stronger pelagic energy flow in the AI. Myctophids are found in cod diets only in the AI, reflecting the oceanic nature of the food web there.

Fisheries are the most important predators of Pacific cod in both the AI and EBS (Figure 11-3). Simulated impacts of changing cod fishing mortality differ by ecosystem as well, with the impacts felt most strongly and with highest certainty in the AI ecosystem according to this analysis (Figure 11-4). In particular, limited diet data suggest an interaction between cod and (juvenile) sablefish in the AI that was not present in the EBS. The larger impact of cod mortality in the AI observed in these simulations is a combined result of different diet relationships and the higher biomass per unit area in the AI relative to the EBS; the difference in fishery exploitation rates observed above was not included in the ecosystem simulation analysis. Separate management of the cod fishery in the AI would ensure that any potential ecosystem effects of changing fishing mortality might be monitored at the appropriate scale.

(12) Ongoing and future research

There are several projects that are either underway or soon to begin that may provide additional information for consideration of an EBS vs. AI TAC division. All of these projects are funded by the North Pacific Research Board (NPRB); descriptions of these projects can be found on the NPRB website (www.nprb.org) using the project numbers given here. Logerwell and Neidetcher (#618) are conducting an analysis of the distribution of spawning Pacific cod, "Spatial and temporal patterns in Pacific cod reproductive maturity in the Bering Sea", and some of the preliminary data from that project are included in this report (Fig. 8-1). Spies (#817) received funding in 2008 for a project titled "A landscape genetics approach to Pacific cod (*Gadus macrocephalus*) population structure in the Bering Sea and Aleutian Islands; investigation of ecological barriers to connectivity between potentially distinct population components", which should provide additional information on genetic variation within the EBS and AI. Munro et al. (#815) will conduct a large-scale tagging project, "Pacific cod (*Gadus macrocephalus*) migration and distribution related to spawning in the eastern Bering Sea: a mark-recapture experiment on a large geographic scale". While this project is focused on the EBS, it may provide additional information on movement between the EBS and AI. Hurst and Miller (#816) are conducting the project "Estimating source contribution and dispersal histories of Pacific cod recruits using otolith elemental composition", which also deals primarily with the EBS. There are additional projects being conducted as part of the NPRB's Bering Sea Integrated Research Program (bsierp.nprb.org) that may provide useful information.

References

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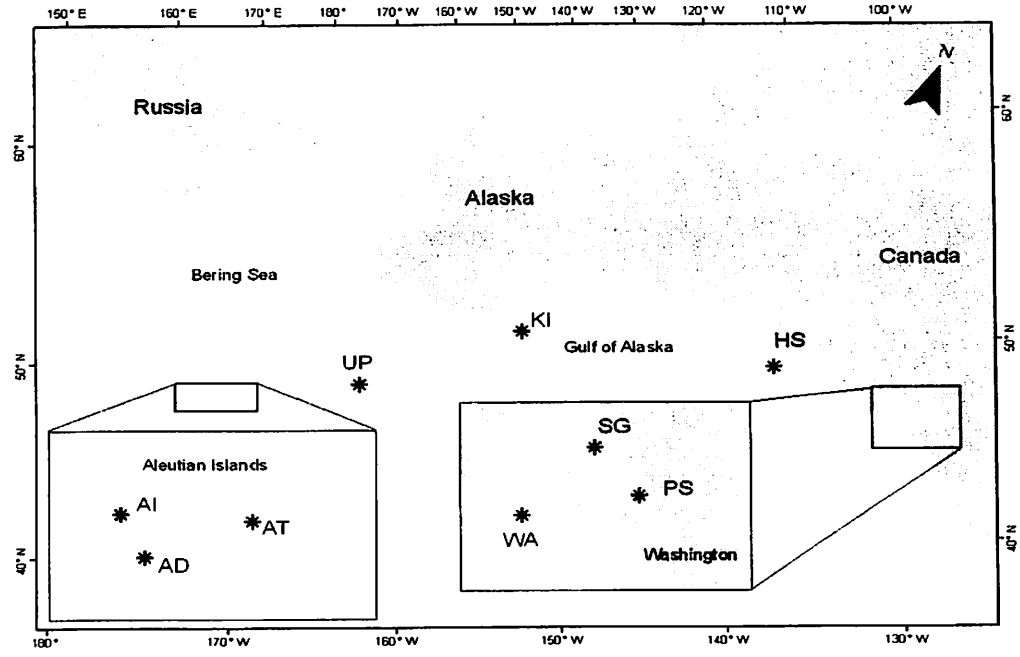


Figure 1-1. Sample locations for Pacific cod. Sample abbreviations are Unimak Pass (UP), Kodiak Island (KI), Hecate Strait (HS), coastal Washington State (WA), Puget Sound (PS), and Strait of Georgia (SG). For the central Aleutian Islands, sample labels indicate samples taken from Aleutian Islands (AI), Adak Island (AD), and Atka Island (AT).

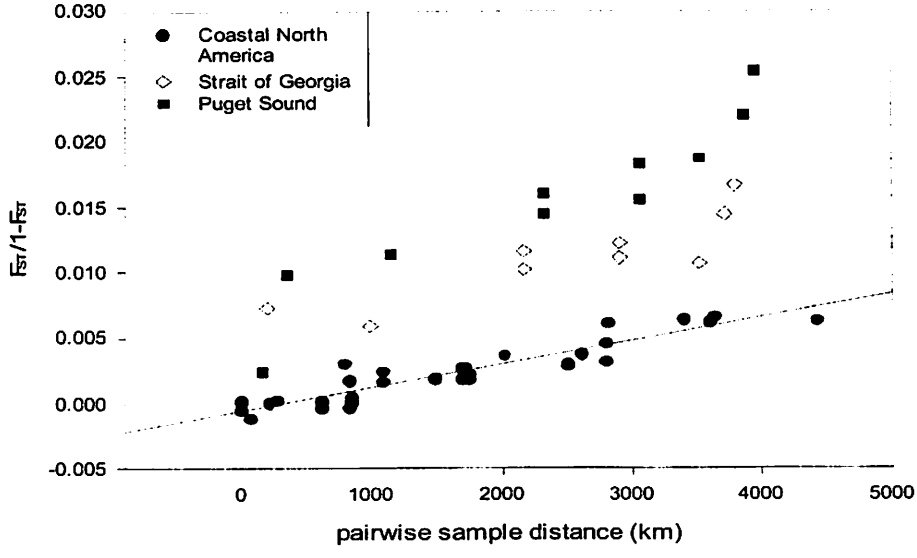


Figure 1-2. Linearized F_{ST} values versus geographic distance for Pacific cod. Regression line is fitted to data from coastal samples in North America (closed circles).

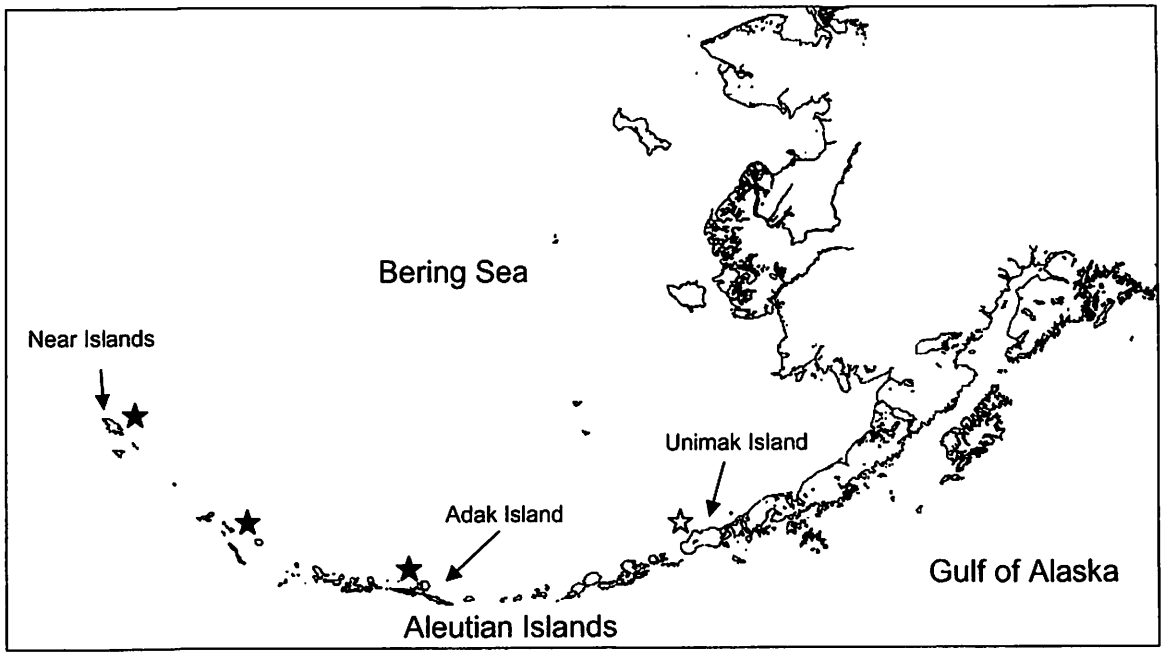


Figure 2-1. Map of the Bering Sea and Aleutian Islands. Solid stars = areas where Aleutian Islands samples were collected for analyses in sections 2, 5, 6, & 7; white star = area where Eastern Bering Sea samples were collected for analyses in sections 2, 5, 6, & 7.

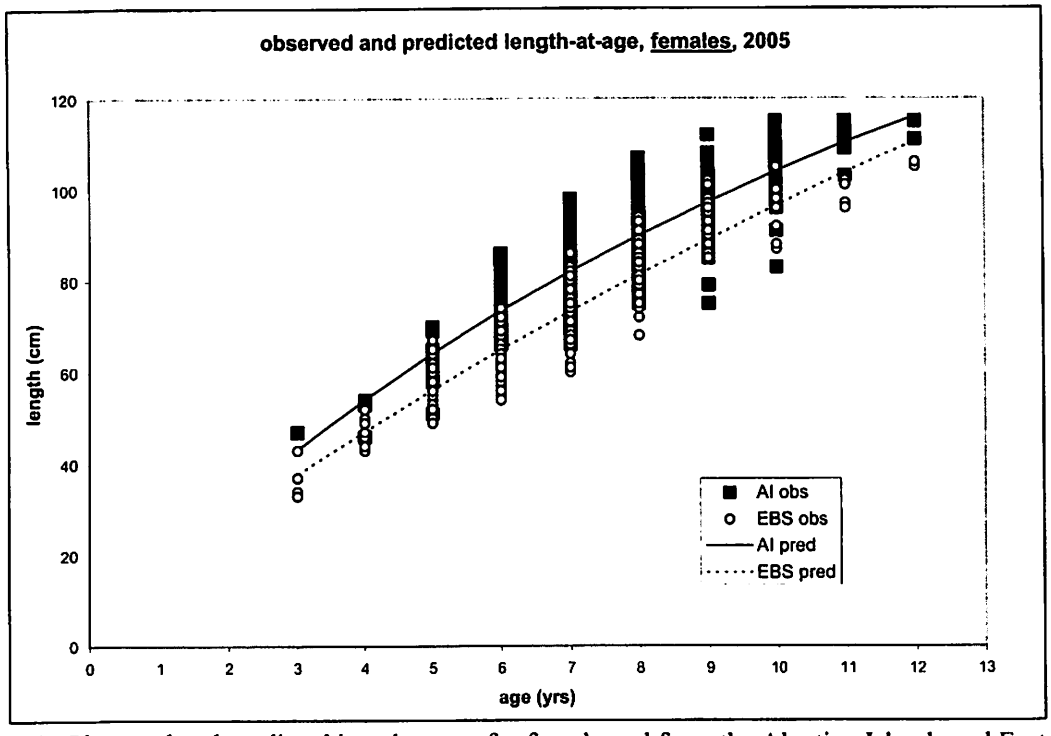


Figure 2-2. Observed and predicted length at age for female cod from the Aleutian Islands and Eastern Bering Sea.

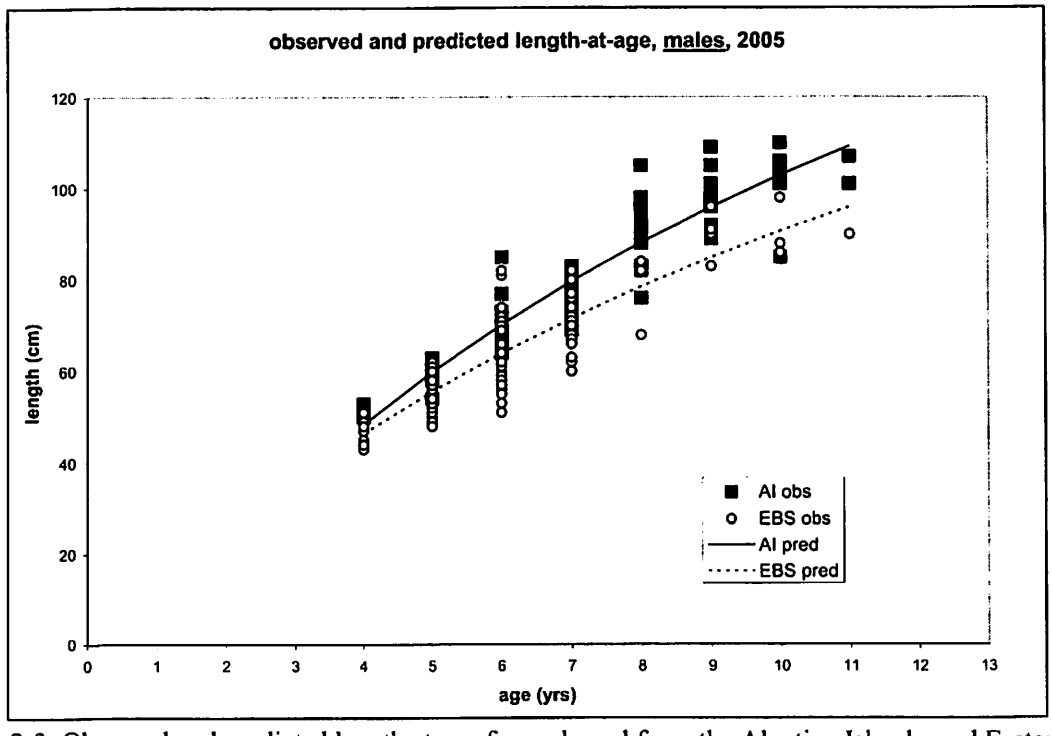


Figure 2-3. Observed and predicted length at age for male cod from the Aleutian Islands and Eastern Bering Sea.

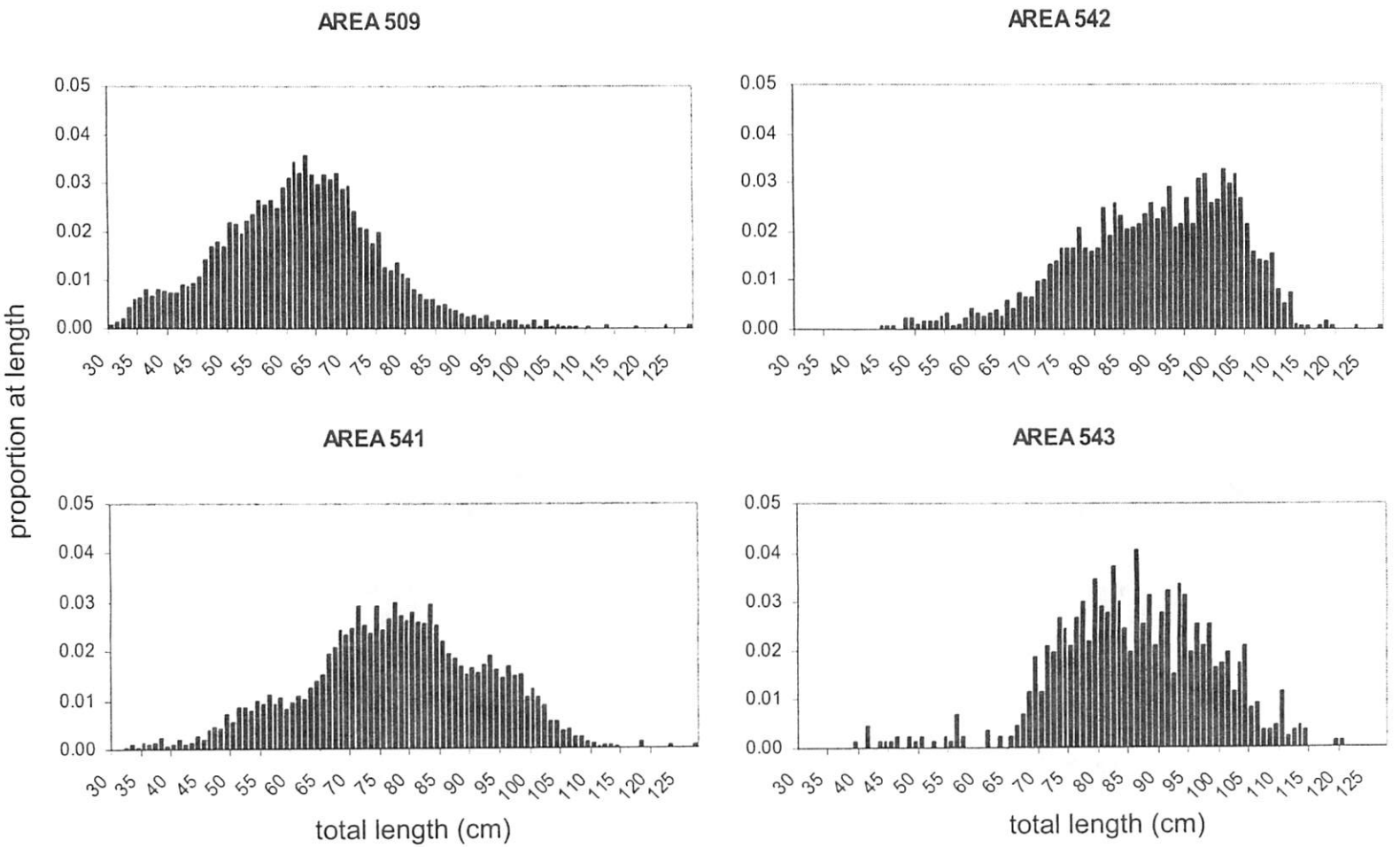
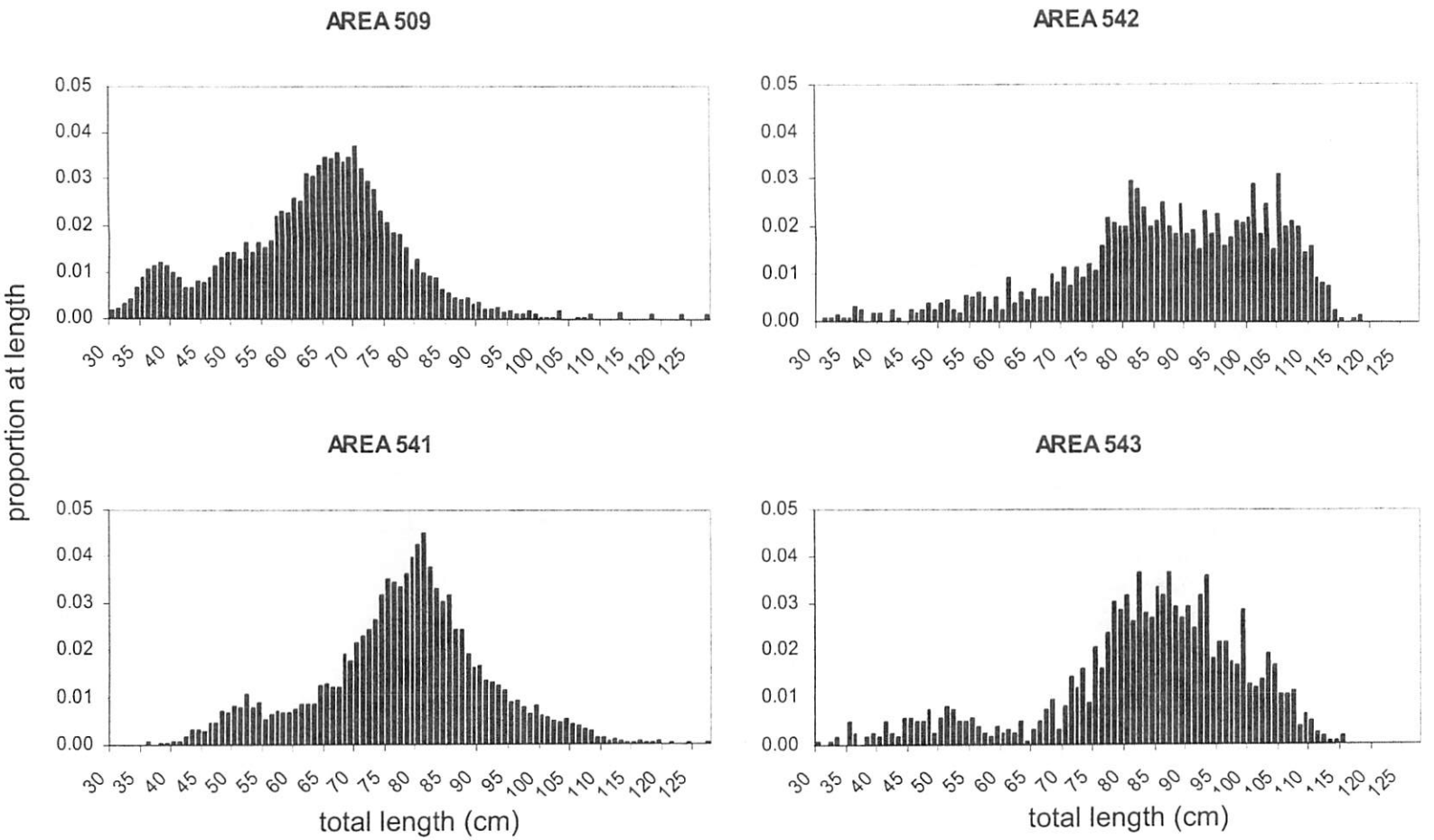


Figure 3-1. Length frequency proportions of Pacific cod from all observed hauls using bottom trawl gear, **January-March 2004**. Both sexes of cod are included. Areas are NMFS statistical reporting areas: 509 Southeastern Bering Sea, 541 Eastern Aleutian Islands, 542 Central Aleutian Islands, 543 Western Aleutian Islands.



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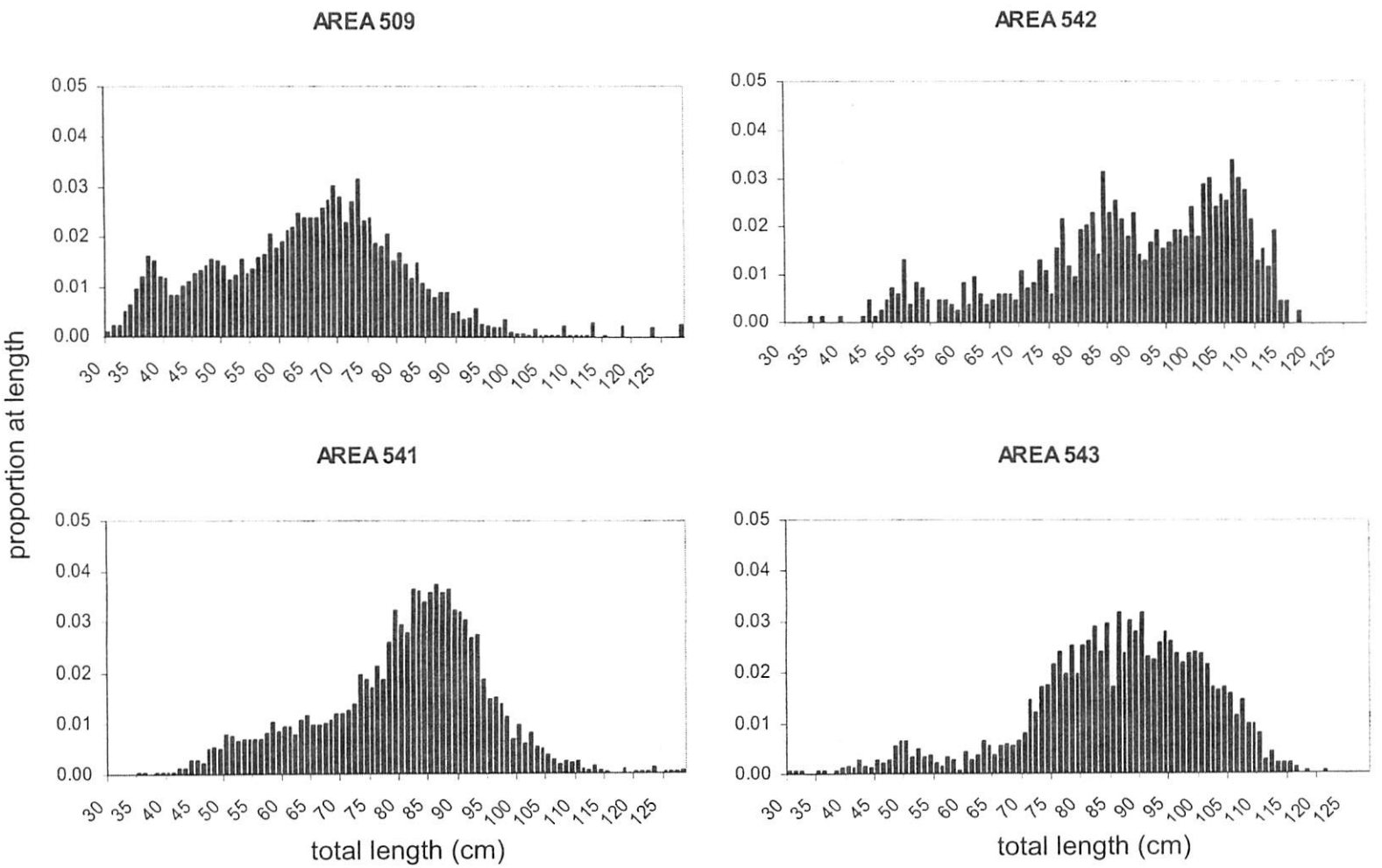

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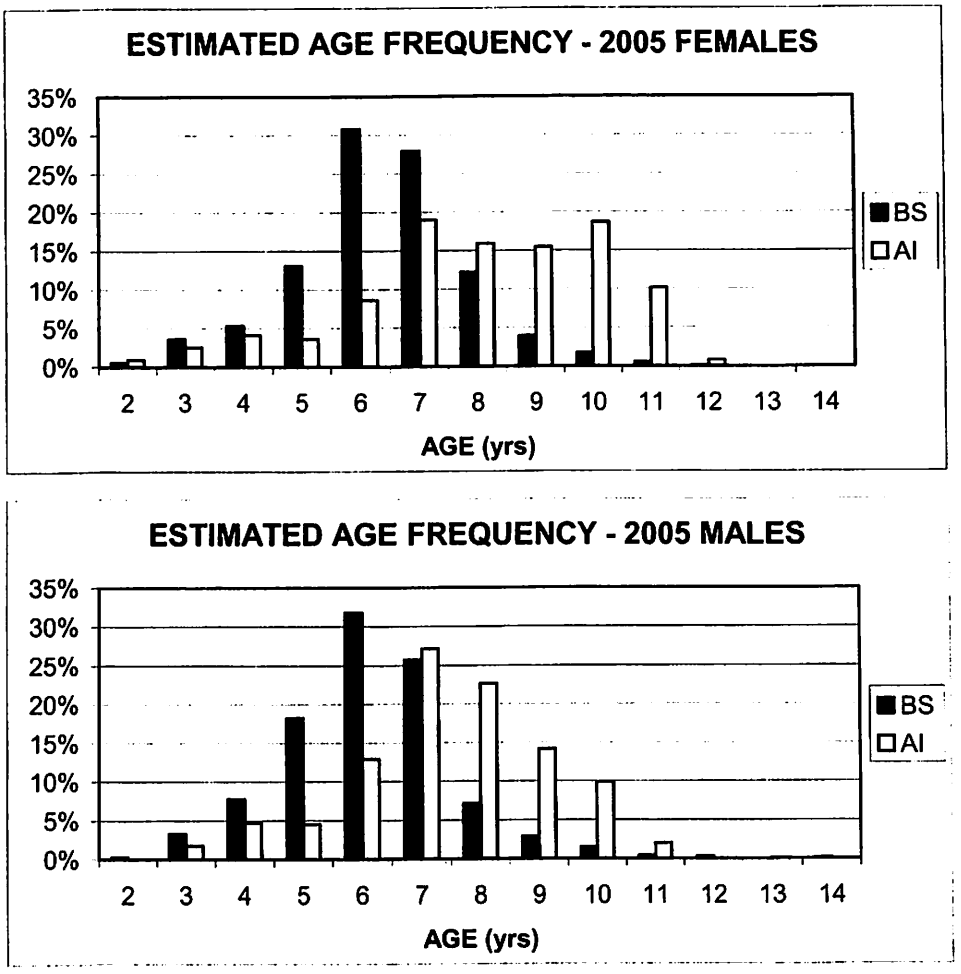


Figure 4-1. Estimated age frequency of Pacific cod by sex in the southeastern Bering Sea (area 509) and in the central and western Aleutian Islands (areas 542 and 543). Bottom trawl length frequency data for January –March 2005 was combined with length-age models fit in section 1 to produce age frequency.

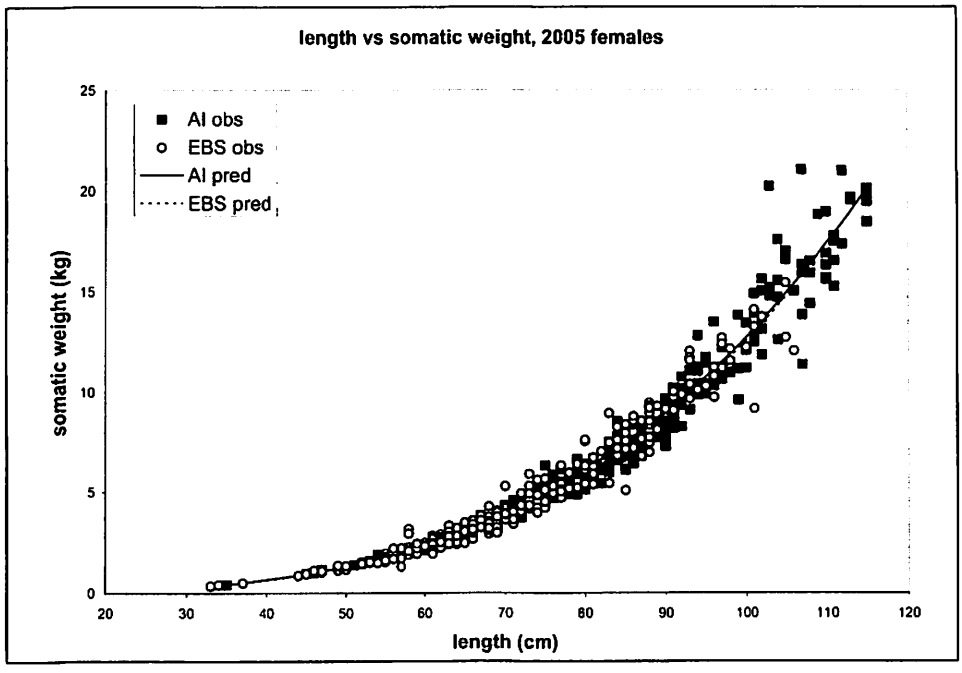


Figure 5-1. Observed and predicted somatic weight for female cod from the Aleutian Islands (AI) and Eastern Bering Sea (EBS).

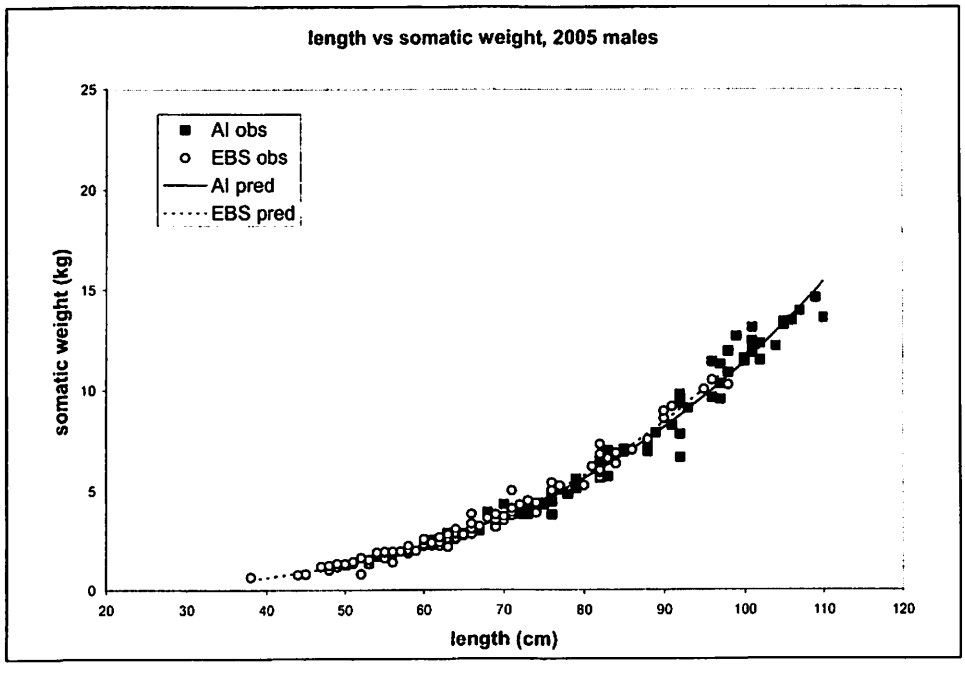


Figure 5-2. Observed and predicted somatic weight for male cod from the Aleutian Islands (AI) and Eastern Bering Sea (EBS).

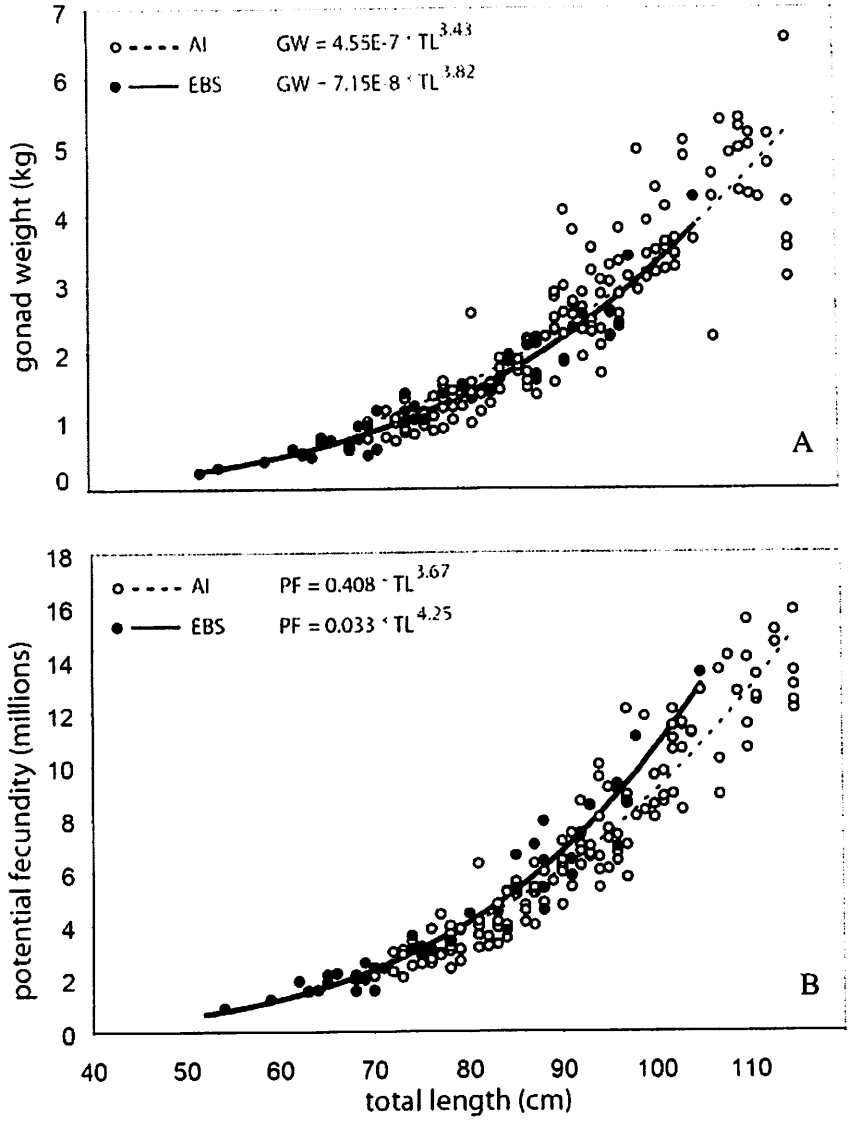


Figure 6-1. Relationship between maternal total length and A) gonad weight (GW) and B) potential fecundity (PF) of female Pacific cod from the Aleutians Islands (AI) and eastern Bering Sea (EBS) in 2005. Sample size: AI = 137, EBS = 44.

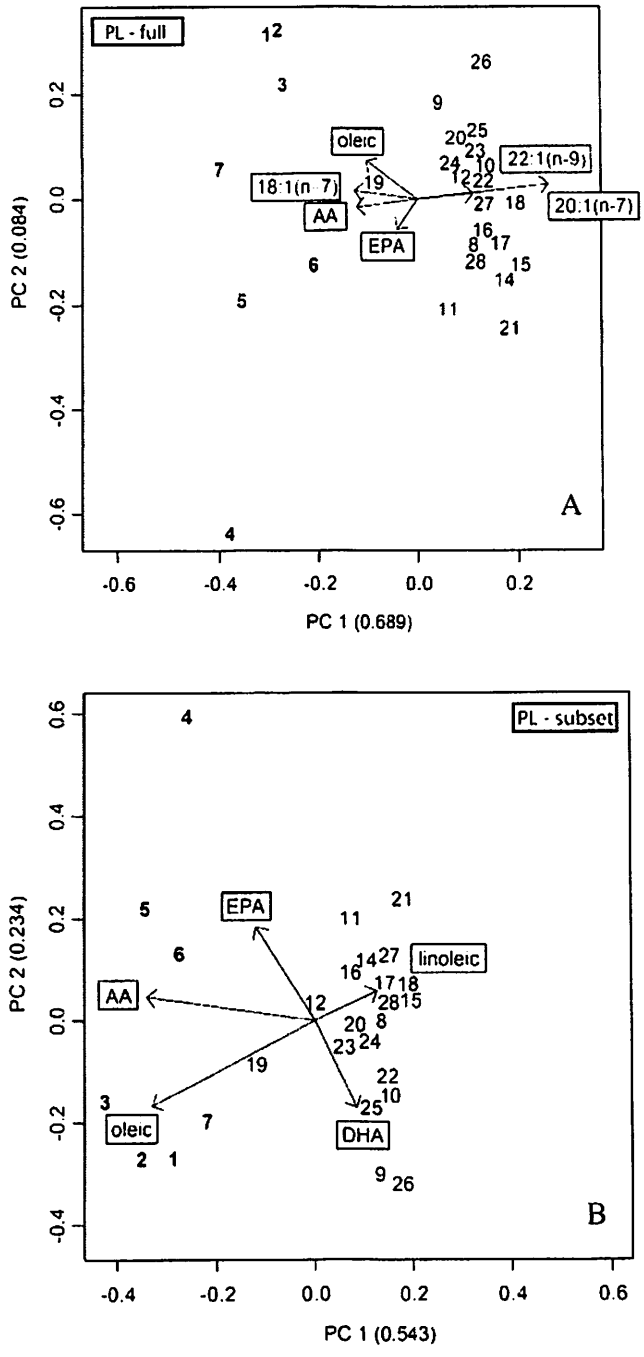


Figure 7-1. Principal component (PC) analysis for fatty acid (FA) composition in the polar lipids (PL) of Pacific cod eggs, using (A) all polyunsaturated FAs (PUFAs) and any FA contributing more than 1% of the total FA pool and (B) only the subset of FAs of potential importance to egg quality. Values following each axis label are the proportions of variability in the dataset explained by each of the first 2 two PCs. Numbers 1-7 (bold) are EBS samples; numbers 8–28 are AI samples. Text boxes indicate the four most important FAs in the first PC and the two most important FAs in the second PC. Length of arrows indicates the relative contribution of that FA in forming the PCs. Direction of arrows indicates the relative contribution of that FA to each of the two PCs. AA = arachidonic acid, EPA = eicosapentaenoic acid, DHA = docosahexaenoic acid .

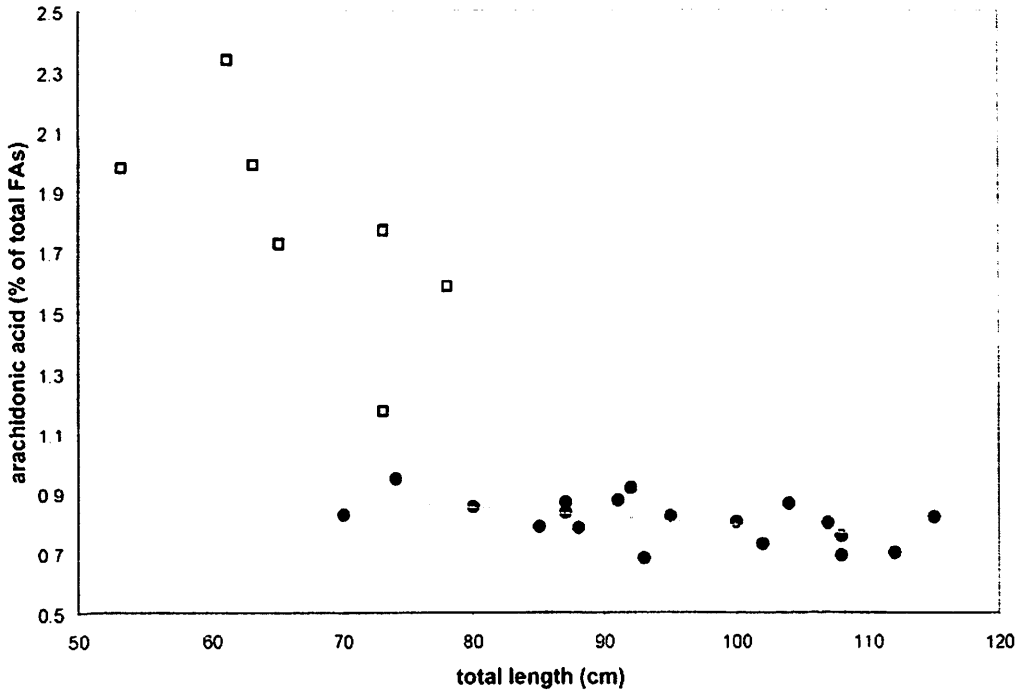


Figure 7-2. Maternal total length versus arachidonic acid , 20:4(n-6), content of polar lipids from Pacific cod eggs. Data are shown as % of total fatty acid (FA) pool in that lipid class. Open squares, EBS; solid circles, AI. Line is the result of least-squares linear regression.

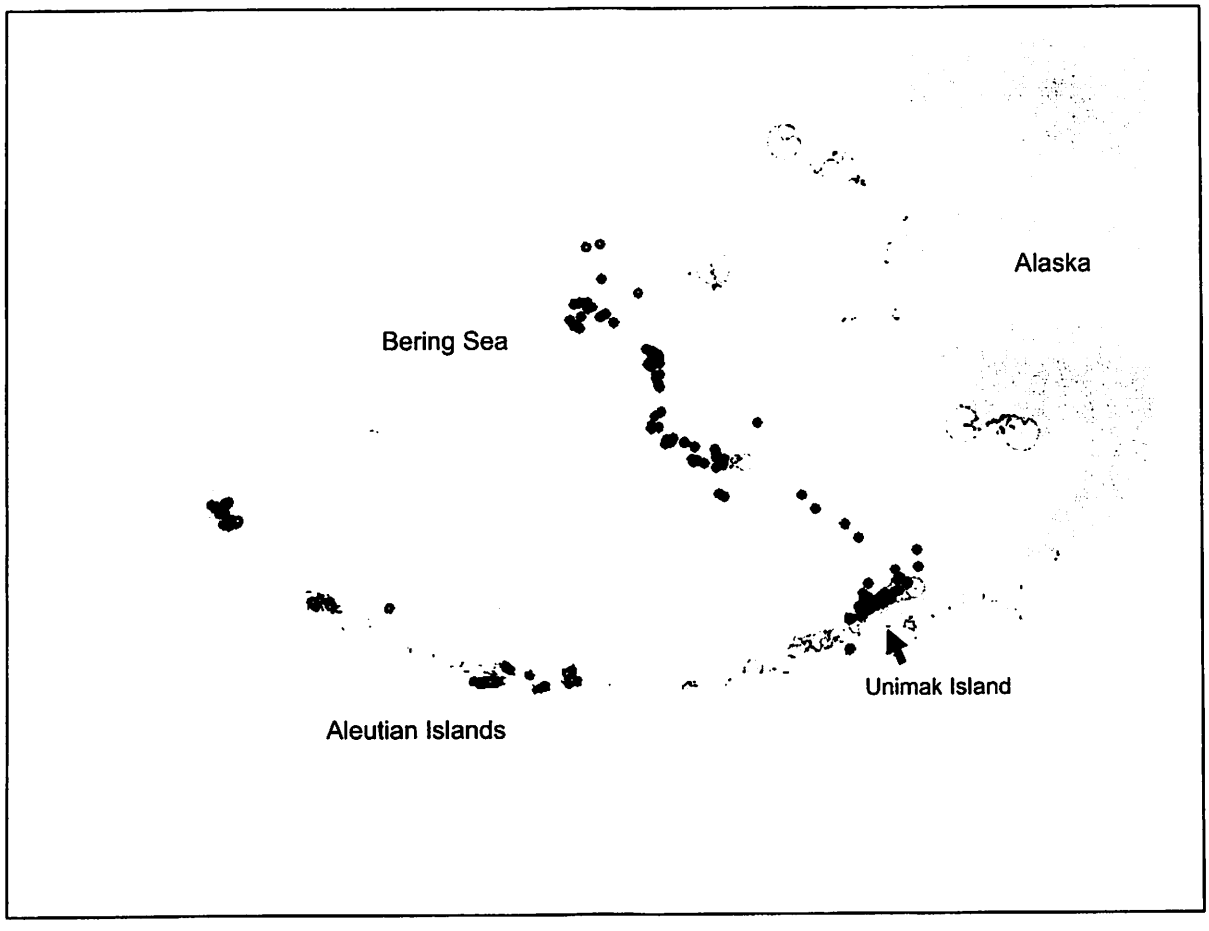


Figure 8-1. Locations in the AI and EBS where females in spawning condition have been observed in commercial fishery hauls. Red (or dark gray) dots indicate catch locations of spawning female cod.

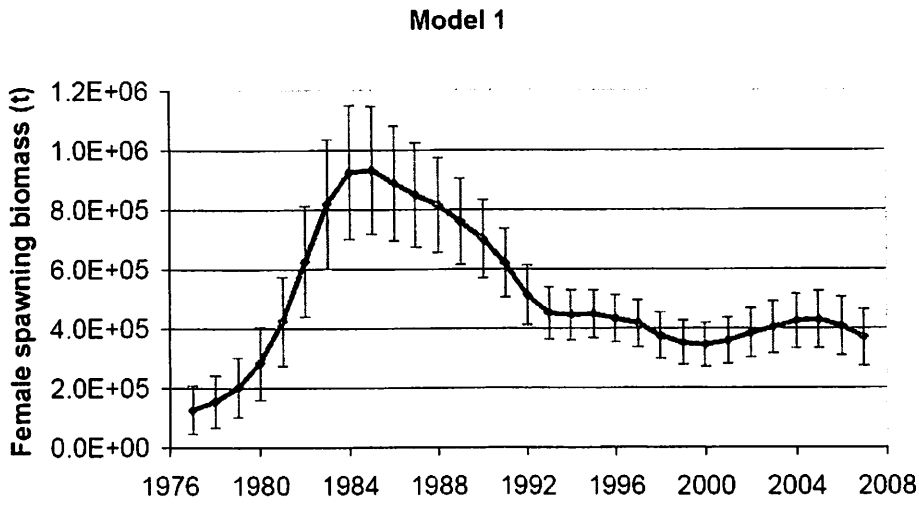


Figure 10-1. Model-estimated female spawning biomass (t) of Pacific cod in the EBS, reprinted from Thompson et al., 2007, Figure 2.3.

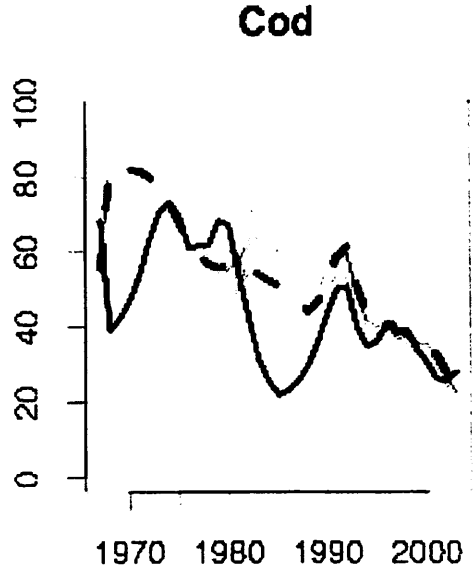


Figure 10-2. Model-estimated total spawning biomass (1000 t) of Pacific cod in the AI, reprinted from Kinzey and Punt, in review, Figure 4. The dashed bold line indicates the standard single species model run. The solid lines indicate multispecies model runs with predation included, with the bold line indicating the best fit of the multispecies models.

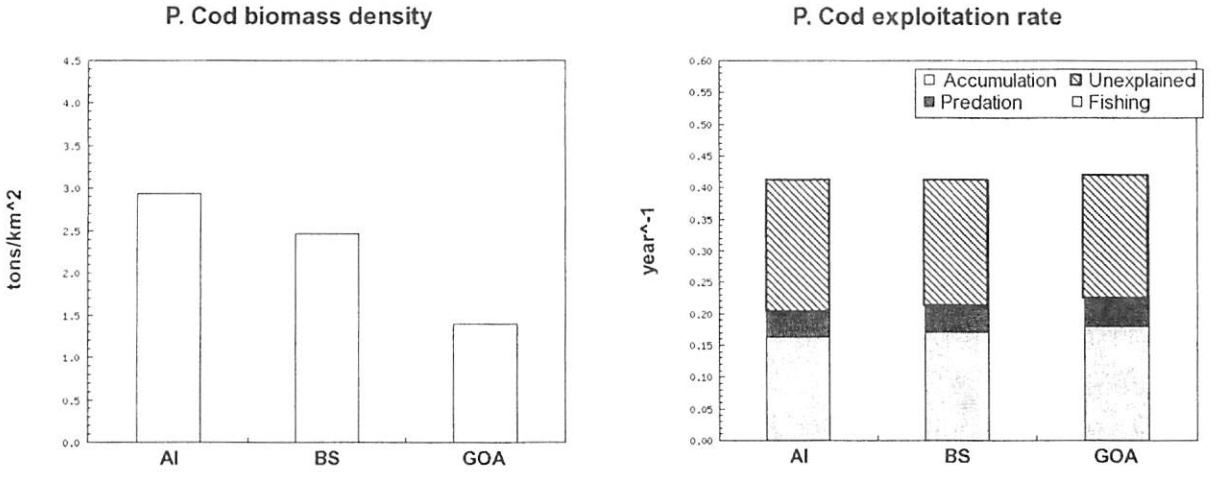


Figure 11-1. Comparative biomass density (left) and mortality sources (right) for Pacific cod in the AI, EBS, and GOA ecosystems. For the AI and GOA, biomass density (left) is the average biomass from early 1990s NMFS bottom trawl surveys divided by the total area surveyed. For the EBS, biomass density is the stock assessment estimated adult (age 3+) biomass for 1991 (Thompson and Dorn 2005) divided by the total area covered by the EBS bottom trawl survey. Total cod production (right) is derived from cod stock assessments for the early 1990's, and partitioned according to fishery catch data and predation mortality estimated from cod predator diet data (Aydin et al. 2007).

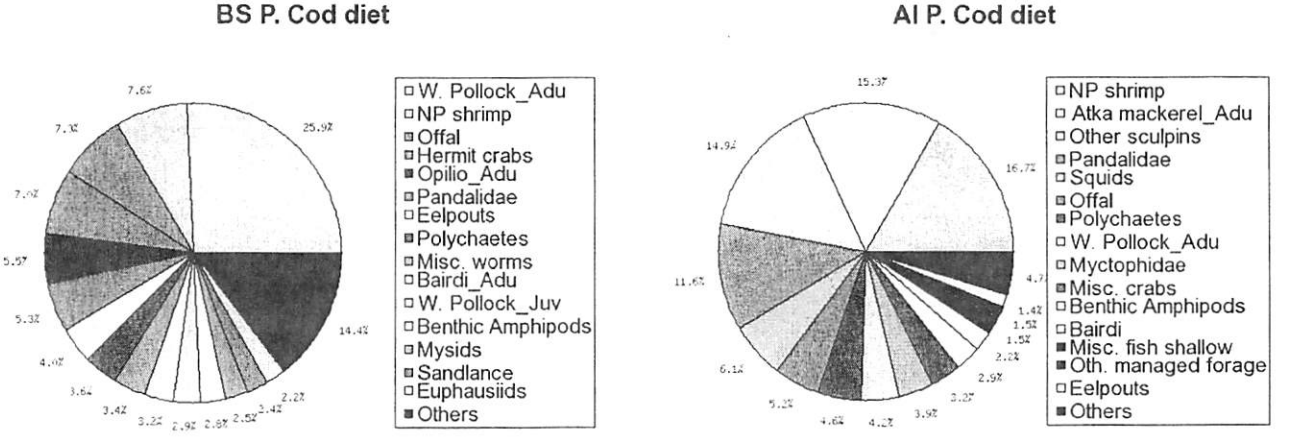


Figure 11-2. Comparison of Pacific cod diet compositions for the EBS (left) and AI (right) ecosystems. Diets are estimated from stomach collections taken aboard NMFS bottom trawl surveys in 1991 (EBS) and in 1991-1994 (AI).

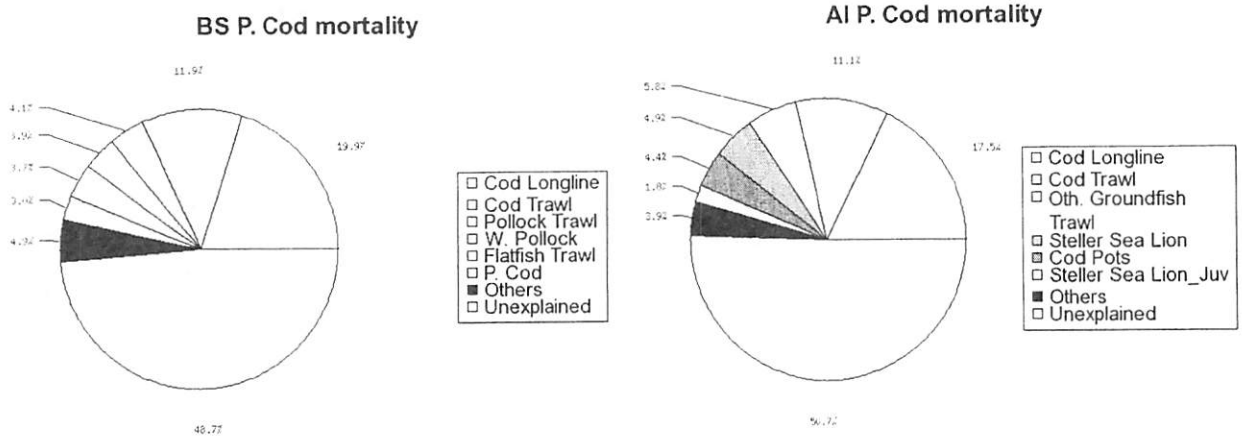


Figure 11-3. Comparison of Pacific cod mortality sources for the EBS (left) and AI (right) ecosystems. Mortality sources reflect cod predator diets estimated from stomach collections taken aboard NMFS bottom trawl surveys in 1991 (EBS) and in 1991-1994 (AI), cod predator consumption rates estimated from stock assessments and other studies, and catch of cod by all fisheries in the same time periods (Aydin et al. 2007).

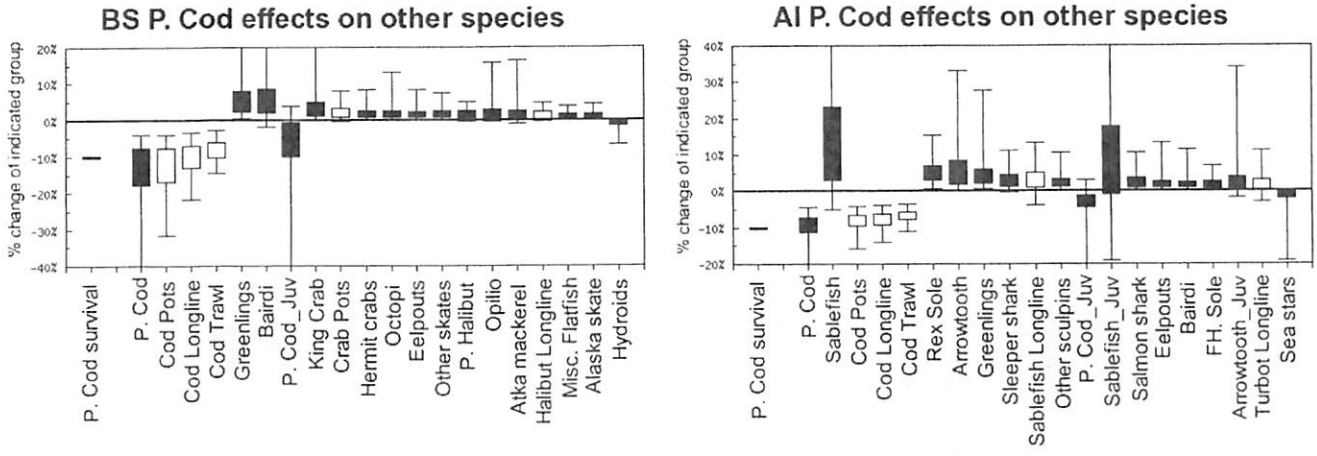


Figure 11-4. Effect of changing cod survival on fishery catch (yellow) and biomass of other species (dark red): EBS (left) and AI (right), from a simulation analysis where cod survival was decreased by 10% and the rest of the ecosystem adjusted to this decrease for 30 years. Note the differences in y-axis scale. Boxes show resulting percent change in the biomass of each species on the x axis after 30 years for 50% of feasible ecosystems, error bars show results for 95% of feasible ecosystems (see Aydin et al. 2007 for detailed methods).

AGENDA C-3(c)(2)
DECEMBER 2008

Apportionment of BSAI Pacific Cod Sector Allocations Between BS and AI Areas

Discussion paper

December 2008

At its October 2008 meeting, the Council received a report by the SSC regarding separating the combined BSAI Pacific cod specifications into BS and AI specifications. The SSC supported setting a combined BSAI OFL and separate ABCs for the BS and AI for Pacific cod. In recognition of the challenging management issues associated with apportioning the BSAI Pacific cod sector allocations between areas if the BSAI Pacific cod TAC was apportioned between the BS and AI, the Council tasked staff to update a February 2008 discussion paper on the apportioning of BSAI Pacific cod sector allocation between BS and AI areas, for review at the December 2008 Council meeting.

The discussion paper begins with a description of the problem statement and existing alternatives followed by an overview of past Council action on apportioning BSAI Pacific cod allocations. The discussion paper also includes an overview of LLP area endorsements by sector, an update on the State water Aleutian Islands Pacific cod fishery, a brief description of the harvest distribution for Pacific cod between BS and AI by sector, a description of halibut PSC mortality in the BSAI Pacific cod fishery, an overview of Steller sea lion issues associated with proposed action, and finally, a description of the effects of the existing alternatives on the sectors.

1.1 Problem Statement and Existing Alternatives

The proposal to establish separate Pacific cod sector allocations between the BS and AI areas was originally included as part of BSAI Amendment 85, but was removed from this amendment package prior to final action[1] (see Section 1.2). The original problem statement is provided below. The problem statement addresses the need to establish a methodology by which to maintain sector allocations while recognizing that the cod gear sectors have different catch history and dependency on the two areas, should the BSAI Pacific cod TAC be apportioned between the BS and AI areas during a future specifications process. If the Council determines that it is likely that the TAC groupings will be modified in the foreseeable future, it would be beneficial to provide direction to NMFS regarding the formula for establishing new area allocations to each sector.

This discussion paper reviews the three primary alternatives originally proposed for this action. The intent is to provide direction to NMFS regarding how to establish sector allocations in the BS and AI management areas prior to separate TACs being issued in the annual specifications process. Absent this direction, there is concern that the time necessary to undergo an analysis and notice and comment rulemaking after the TAC is divided would cause significant disruption of the cod fisheries. Absent any action on this issue, NMFS could only implement equal allocations in both areas (e.g., if a sector receives a 40% BSAI allocation, it would receive 40% of the BS TAC and 40% of the AI TAC upon a TAC split). While this is one of the methodologies evaluated (Alternative 2), the public and the Council raised concerns about this methodology being the only potential solution by default. The primary concern being that it does not reflect recent historical catch by sector in the Aleutian Islands.

[1]Council final action was April 9, 2006. Amendment 85 was effective starting in 2008.

Problem Statement: Apportionment of BSAI Pacific cod Sector Allocations between BS and AI

In the event that the BSAI Pacific cod ABC/TAC is apportioned between the BS and the AI management areas, a protocol needs to be established that would continue to maintain the benefits of sector allocations and minimize competition among gear groups; recognize differences in dependence among gear groups and sectors that fish for Pacific cod in the BS and AI; and ensure that the distribution of harvest remains consistent with biomass distribution and associated harvest strategy.

The following are the existing alternatives that were included in Amendment 85 prior to Council removal, with the exception of Options 2.1, 3.1, and 4.5, which were added at a later meeting (see Section 1.2):

ALTERNATIVE 1: No action. A methodology to apportion the BSAI Pacific cod allocations to the jig, trawl, and fixed gear sectors between the BS and AI subareas would not be selected.

ALTERNATIVE 2: Sector allocations remain as BSAI (with BS and AI TACs)

No allocation to a sector of a specific percentage of a sub-area. Sectors would have a BSAI allocation to fish in either sub-area (BS and AI) if the sub-area is open for directed fishing and TAC is available.

Option 2.1 Upon splitting the BSAI Pacific cod sector allocations between the Bering Sea and Aleutian Islands, separate BS and AI LLP area endorsements would be converted to BSAI area-wide endorsement for the Pacific cod fishery.

ALTERNATIVE 3: BS and AI sector allocations based on equal percentage from BSAI sector allocations

This alternative provides an allocation to a sector of equal percentage in both sub-areas. The allocation percentage of BSAI TAC a sector receives would result in that same percentage being applied to both the BS and AI sub-areas so that a sector would have the same percentage in both sub-areas.

Option 3.1 Upon splitting the BSAI Pacific cod sector allocations between the Bering Sea and Aleutian Islands, separate BS and AI LLP area endorsements would be converted to BSAI area-wide endorsement for the Pacific cod fishery.

ALTERNATIVE 4: BS and AI sector allocations based on a sector's historic harvest in the AI with remainder of sector's overall BSAI allocation to be caught in the BS. Sector's BSAI allocation is maintained and used in annual calculation.

Option 4.1 1995–2002
Option 4.2 1997–2003
Option 4.3 2000–2003
Option 4.4 2002–2003

Option 4.5 Upon splitting the BSAI Pacific cod sector allocations between the Bering Sea and Aleutian Islands, separate BS and AI LLP area endorsements would be converted to BSAI area-wide endorsement for the Pacific cod fishery.

Note that methods to apportion the BSAI Pacific cod CDQ reserve between the BS and AI areas are not included in this discussion paper. Alternatives 1–4 only apply to the non-CDQ fisheries. The regulations for the CDQ reserves are at 50 CFR 679.20(b)(1)(iii). Paragraph (C)(1) addresses the apportionment of the overall CDQ groundfish reserves by TAC category, and (C)(2) addresses how to modify the CDQ reserves if overall TACs are split or combined during the final harvest specifications. NMFS has

operated such that if a new TAC is established, the CDQ Program receives its 10.7% allocation, unless a species is explicitly allocated at a different percentage (e.g., pollock under the AFA) or explicitly not allocated to the program (e.g., squid). Thus, if the BSAI Pacific cod TAC is split into BS and AI area TACs, under the status quo allocations, the CDQ Program would receive 10.7% of the BS TAC and 10.7% of the AI TAC.

1.2 History of the Pacific cod area apportionment

As stated previously, apportionment of BSAI Pacific cod sector allocations between the BS and AI was originally included as part of Amendment 85. However, at final action in April 2006, the Council removed the apportionment of BSAI Pacific cod sector allocations from Amendment 85. The primary reason for this decision was the considerable concerns associated with all of the alternatives. The Council received extensive public testimony on this issue, almost all of which recommended that additional or new alternatives were needed, and that the development of new alternatives should not delay the remainder of Amendment 85, which revised the overall BSAI Pacific cod allocations to each sector. Recognizing the importance of the issue, the Council removed this action from Amendment 85 and tasked staff to prepare a discussion paper on the issue for the October 2006 meeting, in order to develop new alternatives or variations of the existing alternatives.

In October 2006, the Council requested staff continue refining the discussion paper on apportionment of the BSAI Pacific cod sector allocations for February 2007, by incorporating (1) 2004 - 2005 catch history, (2) a new option to each of the alternatives that would make separate Bering Sea and Aleutian Island LLP area endorsements a single BSAI area-wide endorsement for the Pacific cod fishery, only if there is a Bering Sea and Aleutian Island split, and (3) fishmeal production data.

In February 2007, the updated discussion paper was presented to the Council. At that meeting, the Council voted to postpone any further action on apportioning BSAI Pacific cod sector allocations between the BS and AI areas until February 2008, pending additional information from the trawl latent license action and ongoing BSAI Pacific cod biological research.

At the February 2008 meeting, the discussion paper was scheduled to be presented to the Council. However, the Council postponed a review of the issue due to time constraints. The SSC and AP reviewed new biological research conducted in the past year and recommended that a comprehensive summary of relevant information related to stock structure be prepared for review by the BSAI Groundfish Plan Team in September and reviewed by the SSC in October 2008.

In response to this request from the SSC in February 2008, staff at the Alaska Fisheries Science Center compiled all available evidence for separate Pacific cod stocks in the AI and in the BS for presentation at the October 2008 meeting. After review of this information, the SSC noted there was sufficient justification for a split in BSAI Pacific cod between the BS and AI areas. The SSC recommended that a precautionary approach should be taken by specifying separate ABCs for BSAI Pacific cod. The Council, in response to the SSC's recommendation and in anticipation of further recommendations during the final specifications at this December 2008 Council meeting, tasked staff to bring back this discussion paper reviewing the problem statement and effects of the alternatives for apportioning each sector's BSAI Pacific cod allocation between the two areas.

1.3 LLP area endorsements by sector

Groundfish licenses are currently required to participate in the BSAI groundfish fisheries in Federal waters. Groundfish licenses contain endorsements that define what the vessel using the license is allowed to do. Area endorsements define the geographic locations the licenses allow a vessel to fish. Under the

groundfish LLP, separate BS and AI area endorsements were issued and earned based on historic fishing patterns. Looking just at BSAI, licenses may contain endorsements for both areas (BS and AI), or one of the two areas. Gear endorsements define what type of gear may be used: non-trawl, trawl, or both. Further, cod gear endorsements are required for non-trawl vessels ≥60' to participate in the BSAI fixed gear Pacific cod fishery: hook-and-line catcher processors, pot catcher processors, hook-and-line catcher vessel, and pot catcher vessel. Vessels fishing with jig gear in the BSAI are exempt from the LLP, provided they comply with size and gear limitations.

Table 1 shows the number of groundfish LLPs with a Bering Sea and/or Aleutian Islands endorsement by sector, as of October 2008. Generally, this table shows the number of licenses associated with each eligible sector that may currently fish in the Federal BS and AI management areas for Pacific cod. Regardless of whether the BSAI TAC is split into separate area TACs, only those vessels with an AI endorsement may fish in Federal waters in the AI, and only those vessels with a BS endorsement may fish in Federal waters in the BS.

Table 1 Number of BS, AI and BSAI LLPs in the BSAI Pacific cod sectors

SECTOR	Permit required and/or eligibility criteria per statute	BS only LLP	AI only LLP	BSAI LLP	Total # of valid LLPs
AFA Trawl CP	AFA CP permit/listed in 208(e)(1)-(20); trawl LLP (CP/BSAI)	1	0	19	20
AM-80	trawl LLP (CP/BSAI); not an AFA trawl CP; must have harvested with trawl gear and processed no less than 150 mt of non-pollock groundfish during 1997 through 2002.	7	1	18	25
Non-AM-80 Non-AFA Trawl CP	trawl LLP (CP/BSAI)	0	0	7	7
AFA Trawl CV	AFA CV permit; trawl LLP (CV/BSAI)[1]	60	0	51	111
Non-AFA Trawl CV	trawl LLP (CV/BSAI)	44	2	4	50
Hook-and-line CP	non-trawl LLP (BSAI/H&L CP cod endorsement)	2	0	35	37
Hook-and-line CV >60'	non-trwl LLP (BSAI/H&L CV cod endorsement)	1	1	7	9
Pot CP	non-trawl LLP (BSAI/pot CP cod endorsement)	3	0	4 (1 interim)	7
Pot CV >60'	non-trawl LLP (BSAI/pot CV cod endorsement)	47	1	4	52
Hook-and-line/Pot <60'	non-trawl LLP (CV/BSAI)	87	2	23	112
Jig CV	LLP is not required for <60' Jig CV in the BSAI	N/A	N/A	N/A	N/A
Total Endorsements		252	6	172	430

Source: List of BSAI LLP licenses October 2008

[1]Note that of the 111 total LLPs held by this sector, there are 98 trawl CV LLPs and 13 trawl CP LLPs (all 13 are transferable; 11 are endorsed for the BSAI and 2 is endorsed for the BS).

Not that a vessel is not limited to participating in one sector if it has the appropriate license and/or permit; thus, the sum of the number of licenses does not represent the number of unique vessels. Note also that the number of LLPs is higher than the number of unique vessels, as one vessel may cary more than one license or a vessel may not yet have been designated for use on a license.

In the trawl CP sectors, the majority of licenses are endorsed for the BSAI, with few vessels endorsed in only one area. In the Am. 80 sector, 7 LLPs are endorsed only for the BS, one LLP is endorsed only for the AI, and the remaining 18 LLPs are endorsed for BSAI. The AFA CP sector has only 1 of LLP that endorsed for the BS, while the remaining 19 are endorsed for BSAI. The remaining 7 CP LLPs (non-Am. 80 non-AFA), are all endorsed for BSAI. These 7 LLPs are not Am. 80 or AFA qualified, therefore these LLPs can only be used to participate in the trawl CV fishery.

In the trawl CV sectors, a large number of the licenses are endorsed for the BS only. In the AFA trawl CV sector, more than half of the total LLPs (60) are endorsed only for the BS; the remaining licenses (51) are endorsed for the BSAI. None are endorsed only for the AI. In the non-AFA trawl CV sector, the majority (44 of 50) of eligible licenses are endorsed only for the BS. Four are endorsed for the BSAI and two are endorsed for the AI only. Thus, only six LLPs in this sector can currently be used to fish in the AI. Note

that three of the 44 vessels without AI endorsements harvested more than half of the total non-AFA trawl CV sector Pacific cod catch during 1995 to 2003.

In the hook-and-line sectors, the majority of the eligible vessels (CP and ≥60' CV) are endorsed for the BSAI, with only 2 CPs and 1 CV endorsed only in the BS, and only 1 CV endorsed only for the AI. In the pot CP sector, there are only 7 eligible LLPs, 4 of which are endorsed for the BSAI and 3 for the BS only. In the ≥60' pot CV sector, the great majority (47 of 52) of licenses are endorsed only for the BS, with only 5 licenses endorsed for the BSAI. In the <60' fixed gear sector, of the 112 total licenses being used on <60' vessels, 87 are endorsed only for the BS, 2 only for the AI, and 23 for the BSAI.

Overall, about 39% of the licenses endorsed for trawl gear are endorsed to fish both areas, and about 34% of the non-trawl gear licenses are endorsed to fish both areas. The majority of licenses (60%) are endorsed for the BS area only.

For those sectors with a majority of participants that hold only a BS endorsement, a relatively small proportion of the fleet would be allowed to harvest the AI sector cod allocation. This appears to be an issue primarily for the non-AFA trawl CV sector, ≥60' pot CV sector, and <60' fixed gear sector. Of these three sectors, however, only the non-AFA trawl CV sector has had a substantial percentage of its overall Pacific cod catch in the AI in recent years. Thus, the possibility that a substantial portion of a sector's overall BSAI allocation is attributed to the AI allocation but only a small portion of the eligible vessels in the sector have AI endorsements may be a significant issue for the non-AFA trawl CV sector.

Note that this situation, in which only a subset of the sector (vessels with AI endorsements) could fish a portion of the TAC that is established only for the AI, is a factor of the decision to split the BSAI TAC between the BS and AI. That initial decision is not considered part of this proposed action, as it is a decision made during the annual specifications process. The Council's decision under this action is limited to determining how to apportion each sector's BSAI allocation into the BS and AI areas, should the TAC split occur in the future. Recall, however, that the existing AI endorsements are based on an individual's history in the AI. Thus, if the BS and AI sector allocations are based on actual harvest history (as proposed under Alternative 4), this alternative should serve to mirror actual harvest history by sector in the AI. Recall that LLPs are not required to fish within State waters, thus, all eligible vessels would continue to be allowed to fish in the BS or AI in the parallel Pacific cod fishery within 3 nm and/or in the State water AI Pacific cod fishery for specific gears and vessels sizes.

Note also that in April 2008, the Council took final action on BSAI FMP Am. 92 to remove latent trawl CV and CP licenses from the BSAI groundfish fisheries. Under the Council's preferred alternative, area endorsements (e.g., BS and AI) would be removed from trawl CV and CP licenses unless the license has at least two trawl groundfish landings during 2000 – 2006 in the endorsement area. The intent is to increase stability in the trawl sectors and protect existing participants from the possible future use of latent licenses, and thus a potential reduction in their gross revenue share due to this participation. Note that the AFA and Am. 80 sectors were exempt from both the BS and AI endorsement thresholds, as they must have met other criteria in the past specific to their cooperative programs. Overall, the Council's action is estimated to reduce the number of trawl CP groundfish licenses endorsed for the BS by 4 and reduce the number existing AI endorsements by 6. For trawl CV groundfish licenses, the Council's action would reduce the number of BS endorsements by 33 and the number of AI endorsements by 5.

In addition, a separate component of BSAI Amendment 92 would create 12 new AI endorsements for use on existing non-AFA trawl CV licenses in the Aleutian Islands. Under the Council's preferred alternative, an estimated 8 new AI endorsements would be earned by <60' non-AFA trawl CV licenses that met the participation criteria. These endorsements would be severable from the overall license, such that they could be transferred to other <60' non-AFA trawl CV licenses. (Note that the existing LLP program does

not allow an endorsement to be severed from the overall license.) In addition, an estimated 4 new AI endorsements are estimated to be earned by ≥60' non-AFA trawl CV licenses that met the participation criteria. These endorsements would not be severable and transferable. As only one of the existing 6 non-AFA trawl CV licenses with AI endorsements is estimated to qualify to retain its AI endorsement under the first part of Am. 92, the intent was to allow recent participants in the AI parallel or State waters cod fishery to qualify for an AI endorsement in order to participate in the new trawl limited access Atka mackerel and POP fisheries, as well as the Pacific cod fishery. The intent is to help facilitate economic development in Adak, recognizing that vessels are more likely to fish in the AI if they have a suite of Federal fisheries in which to participate.

Note that because a vessel is not limited to participating in one sector if it has the appropriate license and/or permit, the number of LLPs in Table 1 is higher than the number of unique vessels, as one vessel may carry more than one license or a vessel may not yet have been designated for use on a license. Regardless of the resulting BS and AI sector allocations established under the proposed action, only the vessels with AI endorsements in each sector are allowed to fish in that Federal management area.

1.4 State water Aleutian Islands Pacific cod fishery

In the past, the BSAI Pacific cod fishery in State waters has been managed as a parallel fishery to the Federal fishery; the Federal government manages all harvests (inside or outside State waters) against the Federal BSAI Pacific cod TAC and allocations, opens and closes seasons, establishes gear restrictions, etc. However, at its December 2005 meeting, the Alaska Board of Fisheries (Board) generated a proposal (BOF proposal 399) to create a new regulation establishing a State waters Pacific cod fishery in the Aleutian Islands. The proposal passed into regulation in February 2006. The primary elements of the State water AI fishery include:

1. The guideline harvest level (GHL) for the state waters fishery will be an amount calculated as 3% of the Federal BSAI Pacific cod ABC. The future calculation (the "source" of the GHL) will be the Council's decision should the BSAI ABC be split into separate AI and BS ABCs in a future TAC specifications process.

2. The fishery may occur only from four days after the initial BSAI parallel catcher-vessel trawl fishery is closed through December 31 each year, or until the GHL is taken. All parallel Pacific cod fishery sectors are closed during the state-waters fishery.

3. Legal fishing gear will be pot, jig, hand troll, non-pelagic trawl, and longline gear.

4. Vessels utilizing non-pelagic trawl gear in state-waters fishery are restricted to 100 feet in overall length or less. Vessels utilizing mechanical jig and longline gear in the state-waters fishery are restricted to 58 feet in overall length or less. Finally, vessels utilizing pot gear are restricted to 125 feet overall length or less.

5. A maximum of 70% of the GHL may be harvested prior to June 10. Any unharvested GHL that has not been harvested by April 1 will be made available in the parallel fishery, which opens after the closure of the state-water fishery. If adequate state-waters GHL remains after the closure of the parallel fishery, then the state-waters fishery may reopen prior to June 10.

6. Any unharvested 'A' season GHL will be rolled into the "B" season opening on June 10. A total of 30% of the GHL plus the unharvested amount from the prior season up to a maximum of 70% will be available for the "B" season. If the GHL has not been achieved

by September 1, the B season will close and the AI will reopen to parallel fishing. If adequate GHL remains the B season will reopen after the B season federal BSAI Pacific cod over 60 pot sector closes.

7. The fishery requires registration with ADF&G of the type of gear to be used.

8. The daily trip limit is 150,000 lbs of Pacific cod; there is also a limit of up to 150,000 lbs of unprocessed Pacific cod onboard the vessel. A vessel may not have more processed fish onboard than the round weight equivalent of the fish reported on ADF&G fishtickets during the AI state waters Pacific cod fishery. Participants must notify ADF&G daily of the amount harvested and the total amount on board.

9. All Pacific cod harvested must be retained. If a participant harvests an amount in excess of the daily trip limit, that excess amount of product must be forfeited to the State.

10. The Commissioner of ADF&G may impose bycatch limitations or retention requirements.

The overall effect of a State waters Pacific cod fishery in the Aleutian Islands is that all sectors, including the CDQ fishery, realized a proportional reduction of 3% of their current Federal BSAI allocations. Table 2 shows catch of AI Pacific cod during 2006 – 2008. The first season of the fishery opened on March 15 and ended on March 24, 2006. Twenty-six vessels registered and participated in the fishery, harvesting about 94% of the first season GHL of 8.50 million pounds was harvested. The second season opened on June 10 and closed on September 1, 2006, with eight vessels harvesting 358,000 pounds. The following year, the A season opened on March 16 and closed on March 23, 2007. Twenty-seven vessels participated in that fishery harvesting 8.2 million pounds of AI Pacific cod. The B season opened on June 10 and closed on September 1, 2007. In that fishery, eleven vessels harvested 2.1 million pounds of AI Pacific cod. A second B season opened on October 1 and closed on December 3, 2007 harvesting 1.3 million pounds with five vessels. In 2008, the A season opened on March 10 and closed on March 18. During that period, 30 vessels harvested 7.5 million pounds of AI Pacific cod from the State-water fishery. During the B season (June 10 - July 9) 18 vessels harvested 4.2 million pounds of AI Pacific cod from the State water fishery.

The intent is to allow additional harvests by the identified sectors in AI State waters, which also results in a redistribution of cod harvests and associated revenues from vessels of all gear types that fish in Federal waters in the AI or in the Bering Sea, and from ports east of 170° W to those vessels that fish in the State water AI fishery. Thus, there may be a disproportionate negative effect on those participants that do not desire to fish in State waters in the Aleutian Islands, compared to those participants that have harvested and want to continue to harvest Pacific cod in the Aleutians and within State waters. In general, the fixed gear and jig gear sectors have reduced the AI share of their total BSAI Pacific cod harvest in recent years, while the trawl sectors have generally increased the AI share of their total BSAI Pacific cod harvest.

Table 2 Aleutian Islands Pacific cod harvest from State-water fishery by season, 2006 – 2008

Year	Season	Opening and Closing	Catch (lbs)
2006	A	March 15 - March 24	8,502,781
	B	June 10 - September 1	357,884
2007	A	March 16 - March 23	8,229,931
	B	June 10 - September 1	2,143,310
	B - 2nd half	October 1 - December 3	1,265,760

Year	Season	Opening and Closing	Catch (lbs)
2008	A	March 10 - March 18	7,477,487
	B	June 10 - July 9	4,235,449

Source: Alaska Department of Fish and Game

1.5 Overview of the Steller sea lion measures for the BSAI Pacific cod fishery

Following the 2000 FMP-level Biological Opinion, a new biological opinion specifically on the newly-adopted Steller sea lion protection measures was issued in 2001. The 2001 Biological Opinion found that groundfish fisheries, including the Pacific cod fisheries, conducted in accordance with the Steller sea lion protection measures were unlikely to cause jeopardy of extinction or adverse modification or destruction of critical habitat for Steller sea lions. The protection measures include fishery-specific closed areas around rookeries and haulouts, and season and gear apportionments. Pacific cod is one of the four most important prey items of Steller sea lions in terms of frequency of occurrence, averaged over years, seasons, and sites, and was especially important in winter (Sinclair and Zeppelin 2002). In order to limit the amount of total cod harvest that could be taken in the first half of the year, for the benefit of foraging Steller sea lions, the protection measures established a seasonal dispersion target for the Pacific cod fishery of 70% in the first season (January 1–June 10) and 30% in the second season (June 10–December 31).[2] Note that Amendment 85 modified the seasonal apportionments by gear sector that were established in the Biological Opinion, but retained the overall target of 70% in the first half of the year, and 30% in the second half.[3] The spatial and temporal dispersion measures that currently apply to the Pacific cod fishery are outlined in Table 3.

Table 3 Spatial and temporal dispersion measures for the protection of Steller sea lions which apply to the Pacific cod fishery

Gear Type	Seasonal and TAC apportionments	Pacific cod rollover in the BSAI	Area restrictions
Pot	Jan 1 – June 10 (51%), Sept 1 – Dec 31 (49%) Pot catcher vessels <60' do not have seasonal apportionments.	Unharvested cod TAC can be rolled over from one season to the next.	Aleutian Islands - No fishing in critical habitat east of 173° W. to western boundary of Area 9, 0-10 nm closures at Buldir, 0-20 nm closure at Agligadak. Bering Sea - 0-3 nm closures around all rookeries and haulouts. 0-7 nm closure around Amak rookeries
Hook and Line (and Jig)	Jan 1 – June 10 (51%), June 10 – Dec 31 (49%) Hook-and-line catcher vessels <60' do not have seasonal apportionments.	Unharvested cod TAC can be rolled over from one season to the next.	Aleutian Islands – Same as for pot gear above. Bering Sea – Same as for pot gear above, plus 0-10 nm closure around Bishop Point and Reef Lava haulouts in Area 8 for hook-and-line vessels ≥60'. The 0-3 nm closures around haulouts does not apply for jig gear.
Trawl	CV Vessels Jan 20 – April 1 (74%), April 1 – June 10 (11%); June 10 – Nov 1 (15%) CP Vessels Jan 20 – April 1 (75%), April 1 – June 10 (25%); June 10 – Nov 1 (0%)	Unharvested cod TAC can be rolled over from one season to the next.	Aleutian Islands – East of 178° W.: 0-10 nm closures around rookeries, except 0-20 nm at Agligadak; 0-3 nm closures around haulouts. Aleutian Islands – West of 178° W.: 0-20 nm closures around haulouts and rookeries until the Atka mackerel fishery inside critical habitat A or B season, respectively, is completed, at which time trawling for cod can occur outside 3 nm of haulouts and 10 nm of rookeries. Bering Sea – 0-10 nm closure around all rookeries and haulouts (except Pribilof haulouts that are closed 0-3 nm).

[2]Table 5.4, p. 153 of the 2001 Biological Opinion, NMFS. October 2001.

[3] NMFS Protected Resources informally consulted on the revisions to the seasonal apportionments and found that they met the target provided in the Biological Opinion.

Given the proposed action could change fishing behavior in the BS and AI for Pacific cod, thereby potential effecting Steller sea lions, it will be necessary to consult with NMFS Protected Resource Division (PR) during this process.

Any change to the current management regime would require consultation with PR, since the current Biological Opinion on the effects on SSL of the groundfish fisheries offshore Alaska was on those fisheries as prosecuted at the time of the Biological Opinion (2001 and its 2003 Supplement). A split in the BSAI Pacific cod sector allocations between BS and AI areas would be considered a change in the action upon which PR, the Council, and NMFS previously consulted, and thus PR would need to be consulted again. Additionally, under Amendment 85, PR required informal consultationin order to change the seasonality of BSAI Pacific cod allocations from status quo. Should the TAC be split between the BS and AI, it is likely that PR would need to provide guidance as to the seasonal allocations of Pacific cod by gear type and individual (BS and AI) area. One cannot assume that the current seasonal allocations by gear type for the BSAI combined would satisfy the conditions in the existing Biological Opinion.

Complicating this issue is that NMFS PR is currently developing a new Biological Opinion on the effects of the current Alaska groundfish fisheries on Steller sea lions. PR was scheduled to release this document in early May 2008. However, NMFS informed the Council that additional time is necessary to complete the analyses for the Biological Opinion, and thus it will be delayed. In response to this delay, the Council sent a letter to NMFS requesting a new schedule and timeline for completion of the draft *status quo* Biological Opinion, the proposed schedule for preparation of the draft EIS, and a description of how NMFS intends to interact with the Council and its SSL Mitigation Committee. In response to the Council's request, NMFS has provided two schedules: one, a schedule of milestones if no jeopardy or adverse modification of critical habitat determination is made, and a second schedule showing the milestones if NMFS does make a jeopardy determination. Under both timelines, the preliminary draft Biological Opinion is scheduled for release on October 2009.

The fact that a new Biological Opinion is being developed, which may come to different conclusions in terms of jeopardy or necessary mitigation measures in order to prevent jeopardy, than the existing (2001 and 2003 Supplement) Biological Opinion, makes it very difficult to simultaneously propose changes to the way in which Pacific cod is managed. The Council could develop the analysis to establish separate BS and AI sector allocations at the same time the Biological Opinion is being developed (2009), but the Council would not know for certain the bounds within which the proposed action should be developed until after the Biological Opinion is released. The risk is that the Council may put a lot of effort into developing a preferred alternative which does not meet the conditions outlined in the new Biological Opinion. This issue would most likely apply to any changes in seasonal distribution of catch in the AI, if that differs from the status quo.

Initially, any consultation process on a Council preferred alternative could be conducted informally. PR would require sufficient information on the proposed action to evaluate whether that action would not likely adversely affect the western population of SSL or its designated critical habitat. Several alternative actions could be provided to PR for the consultation. The determination of 'not likely to adversely affect' is reached if PR can conclude that the proposed action's effects on the SSL would be expected to be discountable, or insignificant, or completely beneficial. This determination is generally a "soft trigger", and for many actions, PR is not able to make such a conclusion. If PR cannot conclude that the proposed Pacific cod sector allocations split would not likely adversely affect the SSL and/or its designated critical habitat, then the consultation would continue under a formal process.

Formal consultation could require 6 months to a year to complete, depending on the level of detail and analysis required. The timeline would be determined once detailed information on the proposed action is

provided. The formal consultation process could parallel the biological or socioeconomic analyses. The details of a consultation timeline may also hinge on the NEPA process timeline. The culmination of the formal consultation process would be preparation of a BiOp in which PR would conclude that the proposed action would or would not jeopardize the continued existence of the western SSL or destroy or adversely modify its designated critical habitat. If either jeopardy or adverse modification conclusion is reached, PR would provide a Reasonable and Prudent Alternative (RPA), or the Council may decide to develop an alternative RPA, which would remove either of those conclusions.

1.6 Data used in discussion paper

The background data in this discussion paper are retained harvests from 1995 through 2007, with and without meal. Retained harvest data for CPs are from NMFS Weekly Production Reports; retained harvest data for CVs are from Alaska Department of Fish and Game electronic fish tickets.

The Council's intent in Amendment 85 was to allocate Pacific cod based upon retained harvest, as its retention is required in both the directed fishery and up to the maximum retainable allowance when the directed cod fishery is closed. However, the 100% retention requirement did not begin until January 3, 1998, so that in the years 1995-1997 Pacific cod could be (and were) legally discarded. What has occurred after the 100% retention standards for Pacific cod went into effect is less clear-cut. For example, some catcher vessel deliveries contained fish in poor condition which could not be processed for human consumption. Often, these fish were processed into fish meal, as the fish could not be discarded.

Among the CPs, the inclusion/exclusion of Pacific cod meal products affects the AFA trawl CP sector, as a large portion of the Pacific cod harvested by this sector is taken incidentally in the BSAI pollock fishery. Only a portion of the AFA CP sector processes meal, as the processing infrastructure (and space on board) required for this type of product is substantial. None of the non-AFA trawl CP sector have meal plants onboard. Of the existing alternatives, only those options under Alternative 4 that include 1995-1997 for catch history would be impacted by the inclusion of fish meal in the catch data. The impact of including fish meal in the calculations could result in the AFA CP sector receiving less than a .5% higher portion of its BSAI Pacific cod allocation in the AI and the Trawl CV sector, which would receive slightly higher than 1% higher portion of its allocation in the BS. To get an indication of the extent of Pacific cod destined for meal production, separate tables with and without meal have been included in the background data and under Alternative 4, Option 1 to demonstrate the impacts of including meal in the sector apportion calculations.

1.7 Harvest distribution between BS and AI by sector

In considering the division of the BSAI Pacific cod sector allocations between BS and AI management areas upon a TAC split, it is useful to consider the historic harvests from those areas. This section provides a general description of historic harvests from 1995 to 2007. Table 4 shows the amount and proportion of retained catch between the BS and AI areas during 1995–2007 without meal, and Table 5 shows that same information with meal included. The data show that retained catch from the AI fluctuated from 1995 through 1997, then stabilized from 1999 through 2004 at between 15% and 20% of the combined BSAI retained catch, and then in 2005 and 2006, catch from the AI declined to about 11% each year. In 2007, catch in the AI relative to the total BSAI increased to about 16%. The effect of including meal in the catch statistics increases the overall BS history one or two tenths of a percent while decreasing the overall AI history the same percent.

In previous assessments, the AI TAC was projected to be set at 15% of the BSAI TAC. Note that in 2000 – 2003, harvests from the AI have exceeded 15% of the BSAI Pacific cod harvest on average (about

17%), while in the most recent years (2004 – 2007), harvests from the AI have not exceeded 15% (averaging about 13%).

Table 4 Pacific cod retained catch in the Aleutian Islands and Bering Sea from 1995 to 2007 without meal (in metric tons and percent of total)

Area		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Aleutian Islands	Retained catch	9,782	21,603	13,169	25,187	24,441	29,793	30,410	27,442	29,384	26,645	19,822	18,707	24,385	300,769
	Percent of BSAI	5.5%	11.2%	6.2%	15.3%	17.0%	18.5%	19.9%	16.5%	16.2%	14.2%	11.2%	11.4%	16.6%	13.5%
Bering Sea	Retained catch	167,255	171,798	200,245	139,382	119,643	131,434	122,141	138,795	151,496	161,640	157,102	145,396	122,602	1,928,930
	Percent of BSAI	94.5%	88.8%	93.8%	84.7%	83.0%	81.5%	80.1%	83.5%	83.8%	85.8%	88.8%	88.6%	83.4%	86.5%
BSAI	Retained catch	177,037	193,402	213,414	164,569	144,084	161,228	152,551	166,236	180,880	188,285	176,924	164,103	146,987	2,229,699

Source: WPR and fish ticket data (catch data-1.xls and tables 2 and 3.xls)

Table 5 Pacific cod retained catch in the Aleutian Islands and Bering Sea from 1995 to 2007 with meal (in metric tons and percent of total)

Area		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Aleutian Islands	Retained catch	9,782	21,603	13,169	25,226	24,475	29,832	30,412	27,445	29,387	26,654	19,822	18,708	24,391	300,906
	Percent of BSAI	5.5%	11.1%	6.2%	15.1%	16.7%	18.3%	19.7%	16.2%	16.0%	13.9%	11.0%	11.2%	16.3%	13.3%
Bering Sea	Retained catch	167,632	172,324	200,365	141,330	121,913	133,517	123,930	141,903	153,739	164,460	160,744	148,183	125,383	1,955,423
	Percent of BSAI	94.5%	88.9%	93.8%	84.9%	83.3%	81.7%	80.3%	83.8%	84.0%	86.1%	89.0%	88.8%	83.7%	86.7%
BSAI	Retained catch	177,414	193,928	213,534	166,556	146,388	163,349	154,342	169,347	183,126	191,114	180,566	166,891	149,774	2,256,329

Source: WPR and fish ticket data (catch data-1.xls and tables 2 and 3.xls)

Table 6 shows, for each sector, the average annual retained catch, without meal, in each area and the BSAI as a whole, the percent of the sector's catch from each area, and the number of unique vessels with Pacific cod catch in each area and in the BSAI as a whole for two time periods, 1995–1999 and 2000–2007. Table 7 shows the same type of data with meal included. In general, all sectors for which allocations are being considered under this action have some history in both the Aleutian Islands and Bering Sea Pacific management areas. For the AFA trawl CP sector, retained catch data is not shown for the period 2000-2007 because of confidentiality limitations.

A summary of Table 6 and Table 7 shows overall harvest by AFA trawl CP and trawl CV sectors has decreased since 1999, but the trawl CV sector has more than quadrupled its annual catch from the Aleutian Islands during the 2000 to 2007 period. Annual Pacific cod harvest by the hook-and-line CP sector and the ≥60' pot CV sector are stable and largely from the BS in both time periods. Pacific cod harvest by the jig CV sector and ≥60' hook-and-line CV sector are relatively small in both areas. Catches in these sectors are heavily weighted toward the BS. Harvest by fixed gear vessels <60' has increased substantially across the two periods (likely due to the separate allocation established for this sector in 2000), but are predominantly from the Bering Sea in both periods. Finally, including meal changes the catch distribution for the AFA trawl CP sector. During the 2000 – 2007 years, not including meal, the distribution of catch was more heavily favored toward the BS, but when meal is included, the distribution of catch is more even between the two areas.

Table 6 Retained Pacific cod catch (without meal) in the Bering Sea and Aleutian Islands by sector and percent of each sector's catch by area, 1995–1999 and 2000–2007

Sector	Area	1995-1999			2000-2007		
		Average annual catch (mt)	Percent of sector BSAI catch	Unique vessels	Average annual catch (mt)	Percent of sector BSAI catch	Unique vessels
Hook and Line and Pot CVs < 60'	AI	*	*	19	*	*	29
	BS	*	*	70	*	*	98
	BSAI	*		79	*		116
Longline CVs	AI	9	28.6%	12	26	10.0%	18
	BS	22	71.4%	25	234	90.0%	36
	BSAI	31		32	260		55
Trawl CVs	AI	2,628	5.8%	42	11,219	32.3%	70
	BS	42,946	94.2%	139	23,497	67.7%	138
	BSAI	45,574		141	34,716		208
Pot CVs	AI	848	5.8%	42	372	2.8%	36
	BS	13,684	94.2%	183	13,043	97.2%	125
	BSAI	14,532		189	13,415		161
Jig CVs	AI	21	7.4%	6	12	9.7%	16
	BS	259	92.6%	67	112	90.3%	62
	BSAI	280		73	124		78
Longline CPs	AI	5,967	6.9%	33	4,609	5.6%	31
	BS	80,248	93.1%	55	78,220	94.4%	50
	BSAI	86,215		56	82,829		51
AM-80[1]	AI	3,676	18.9%	21	8,344	28.5%	16
	BS	15,814	81.1%	39	20,953	71.5%	24
	BSAI	19,491		40	29,297		24
AFA Trawl CPs[1]	AI	*	*	9	*	*	2
	BS	*	*	18	*	*	15
	BSAI	*		20	*		15
Pot CPs	AI	1,283	26.9%	12	215	8.0%	12
	BS	3,491	73.1%	22	2,476	92.0%	11
	BSAI	4,774		24	2,691		16

Source: Tables 4 and 5.xls for 1995-1999 and Catch data-1.xls for 2000-2007.

*Not shown due to restrictions on confidential data

Table 7 Retained Pacific cod catch (with meal) in the Bering Sea and Aleutian Islands by sector and percent of each sector's catch by area, 1995–1999 and 2000–2007

Sector	Area	1995-1999			2000-2007		
		Average annual catch (mt)	Percent of sector BSAI catch	Unique vessels	Average annual catch (mt)	Percent of sector BSAI catch	Unique vessels
Hook and Line and Pot CVs < 60'	AI	*	*	19	*	*	37
	BS	*	*	70	*	*	132
	BSAI	*		79	*		169
Longline CVs	AI	9	28.6%	12	26	10.0%	20
	BS	22	71.4%	25	235	90.4%	38
	BSAI	31		32	260		59
Trawl CVs	AI	14,144	31.5%	63	11,225	31.0%	72
	BS	30,721	68.5%	140	24,928	69.0%	140
	BSAI	44,865		151	36,153		212
Pot CVs	AI	848	5.8%	42	372	2.7%	37
	BS	13,684	94.2%	183	13,187	97.3%	126
	BSAI	14,532		189	13,559		163
Jig CVs	AI	21	7.4%	6	12	9.5%	16
	BS	259	92.6%	67	114	90.5%	62
	BSAI	280		73	126		78
Longline CPs	AI	5,967	6.9%	33	4,662	5.3%	31
	BS	80,248	93.1%	55	82,609	94.7%	50
	BSAI	86,215		56	87,271		51
AM-80[1]	AI	3,676	18.9%	21	8,682	28.7%	16
	BS	15,814	81.1%	39	21,586	71.3%	24
	BSAI	19,491		40	30,268		24
AFA Trawl CPs[1]	AI	*	*	9	*	*	2
	BS	*	*	18	*	*	17
	BSAI	*		20	*		17
Pot CPs	AI	1,283	26.9%	12	275	9.7%	12
	BS	3,491	73.1%	22	2,568	90.3%	11
	BSAI	4,774		24	2,843		16

Source: Tables 4 and 5.xls for 1995-1999 and Catch data-1.xls for 2000-2007.

*Not shown due to restrictions on confidential data

1.8 Halibut PSC by sector

The prohibited species allowances are currently shared among the BSAI trawl and non-trawl fisheries, according to the guidelines outlined in 50 CFR 679.21(e). The Federal regulations provide a sequential process in allocating halibut PSC in the BSAI fisheries. The trawl fisheries receive an initial allocation of 3,675 mt. From this total, 276 mt is subtracted to accommodate PSC bycatch in the CDQ fisheries for 2008 and 2009, leaving 3,400 mt for all BSAI trawl fisheries. For 2010 and each year thereafter, CDQ set aside of trawl halibut PSC will be 326 mt. The remaining amount of BSAI halibut PSC is allocation among the Amendment 80 sector and BSAI trawl limited access fishery. The amount of halibut PSC apportioned to the Amendment 80 sector for 2008 is 2,525 mt. In subsequent years up until 2012, halibut PSC allocated to the Amendment 80 sector will be reduced 50 mt from the 2008 halibut PSC limit for each year. In 2012 and all future years, the halibut PSC limit for the Amendment 80 sector will be 2,325 mt. The amount of halibut PSC allocated to the BSAI trawl limited access fishery is 875 mt. The limit for non-trawl fishery allocation is set at 900 mt, less the 7.5 percent CDQ reserve, leaving 833 mt as the PSC halibut allowance for all BSAI hook-and-line fisheries (jig and pot gear are exempt).

Table 8 provides average halibut mortality by sector in each area and the BSAI in addition to the percent of the sector's halibut mortality from each area from 1995 to 2007. Overall, roughly 95% of the halibut mortality in the Pacific cod fishery was in the BS. (Recall that during that same time period, an average of 87% of the Pacific cod harvest was in the BS, refer to **Table 4** and **Table 5**.) Only two sectors, longline CV and pot CP, had less than 90% of their halibut mortality in the BS, but the relatively proportion of halibut mortality in the BS compared to the AI was still high at 86% and 82% by sector, respectively.

Table 8 Average halibut mortality in the Bering Sea and Aleutian Islands by sector and percent of each sector's halibut mortality by area, 1995- -2007

Sector	Area	Average annual mortality (mt)	Percent of sector BSAI mortality
Longline CVs	AI	0.8	14.36%
	BS	4.77	85.64%
	BSAI	5.57	
Trawl CVs	AI	13.48	2.02%
	BS	654.99	97.98%
	BSAI	668.47	
Pot CVs	AI	0.05	1.20%
	BS	4.1	98.80%
	BSAI	4.15	
Longline CPs	AI	50.91	8.26%
	BS	565.09	91.74%
	BSAI	616	
Non-AFA Trawl CPs	AI	21.79	3.88%
	BS	539.66	96.12%
	BSAI	561.45	
AFA Trawl CPs	AI	*	*
	BS	*	*
	BSAI	*	
Pot CPs	AI	0.21	18.42%
	BS	0.93	81.58%
	BSAI	1.14	
Total of all Sectors	AI	97.09	5.09%
	BS	1808.59	94.91%
	BSAI	1905.68	

Source: Catch data-1.xls

At its February 2006 meeting, the Council requested that available data on halibut PSC harvest rates for the Pacific cod fishery in the BS and AI areas be included in Part II of Amendment 85 as background information.

The data to address this request was provided by an updated (March 2006) PSC data file developed jointly by the Council and the Pacific States Marine Fisheries Commission (PSMFC). These data were sorted by target (Pacific cod), PSC sector, area (Bering Sea or Aleutian Islands) and year. Due to confidentiality issues, the sectors were combined into the following four groups: (1) AFA and non-AFA trawl CVs, (2) AFA and non-AFA trawl CPs, (3) hook-and-line CVs and CPs, and (4) pot CVs and CPs. Data for the <60 hook-and-line and pot CV sector and jig sector are not provided due to confidentiality concerns.

The results of the analysis are shown in Table 9 for the four combined sector groups described above. The PSC data file is based on weekly production reports for each period during the year. For each record of landings by week-ending date, a ratio was calculated by dividing the halibut mortality by the corresponding groundfish harvest. The overall groundfish harvests reported in the PSC file are almost entirely Pacific cod. For example, the relative proportions of retained Pacific cod harvests compared with total groundfish harvests were calculated using other data, and found to vary between 96 percent and 99 percent, depending on the year. It was therefore determined that the total groundfish category in the PSC data file was appropriate for calculating the PSC ratios for the Bering Sea and Aleutian Islands.

Table 9 Halibut mortality as a percent of groundfish mortality in the targeted Pacific cod fishery in the BS and AI, 1995 - 2004

Sector/year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Trawl CV										
Aleutian Islands	0.1521	0.7629	0.1842	0.5267	0.2795	0.1824	0.0941	0.0864	0.1766	0.1418
Bering Sea	1.5962	2.0070	1.1866	2.0852	1.6528	1.5405	1.5614	1.9660	2.7491	1.8143
Trawl CP										
Aleutian Islands	0.2529	1.5161	0.1662	1.2007	1.0487	0.6497	1.4332	0.3293	0.5217	0.2618
Bering Sea	1.7474	2.2099	1.3489	2.9010	3.4204	2.2095	3.1561	3.1131	2.9147	2.8025
Hook-and-line CV & CP										
Aleutian Islands	1.2281	1.0302	0.8758	0.7539	0.7307	0.6782	1.0151	1.0041	0.5217	0.9440
Bering Sea	0.8863	0.9319	0.7981	0.8676	0.7161	0.9098	0.7966	0.6668	2.9147	0.4263
Pot CV & CP										
Aleutian Islands	0.0323	0.0793	0.0022	0.0181	0.0252	0.0002	0.0115	0.0000	0.0000	0.0000
Bering Sea	0.0672	0.0983	0.1012	0.0101	0.0256	0.0166	0.0149	0.0399	0.0115	0.0234

Source: NPFMC PSC data files, March 2006.

The following average (1995 – 2004) annual halibut PSC rates were calculated from Table 9:

Table 10 Average halibut mortality rate (as percent of groundfish mortality in the Pacific cod fishery) by sector and area, 1995 – 2004

Trawl CV	**Halibut mortality rate**	**Hook-and-line CV & CP**	**Halibut mortality rate**
Aleutian Islands	0.2587	Aleutian Islands	0.8782
Bering Sea	1.8159	Bering Sea	0.9914
Trawl CP		**Pot CV & CP**	
Aleutian Islands	0.7380	Aleutian Islands	0.0169
Bering Sea	2.5824	Bering Sea	0.0409

The data indicate that the average (1995 – 2004) halibut PSC rates associated with the Pacific cod fishery in the Bering Sea are higher than in the Aleutians Islands for all sectors. Only the hook-and-line sector realized higher halibut mortality rates in the AI than in the BS in an individual year. While the *average* halibut mortality rate during 1995 – 2004 in the hook-and-line Pacific cod fishery is slightly greater in the BS than in the AI, the rate in the AI is greater in seven of the ten years considered. The average halibut

mortality rate (1995 – 2004) in the pot sector is about 2.4 times higher in the Bering Sea than in the Aleutian Islands. Note that the hook-and-line and pot sector Pacific cod harvest share in the AI has substantially declined as a percentage of the sectors' overall BSAI Pacific cod harvest in recent years.

The largest difference in halibut mortality rates between the two areas is in the trawl CV sector, in which the average (1995 – 2004) Bering Sea halibut mortality rate is over 7 times higher than in the Aleutian Islands. There is a much greater difference in rates between the two areas in several of the individual years during the time period considered.

Overall, halibut mortality rates are higher in the trawl CP sector than in the trawl CV sector, but the trawl CP sector also exhibits a lower rate in the Aleutian Islands. In the trawl CP sector, the average (1995 – 2004) halibut mortality rate is 3.5 times higher in the Bering Sea than in the Aleutian Islands.

Because the halibut mortality rate for all sectors is lower in the AI than in the BS on average, this may be interpreted as a favorable reason to support splitting the BSAI TAC into BS and AI area TACs in a future specifications process. However, a positive impact on halibut mortality is dependent on whether the AI TAC would be constraining to the fishing industry's desired harvest level in the AI. For instance, if established, the AI TAC is projected to be set at 15% of the BSAI TAC. In 2000 – 2003, harvests from the AI have exceeded 15% of the BSAI Pacific cod harvest on average (about 17.5%), as currently there is no limit on how much of the total BSAI Pacific cod TAC that can be harvested in the AI. Thus, based on 2000 – 2003 harvest distribution, one could assert that without a TAC split, a higher share of the BSAI Pacific cod harvest would be harvested in the AI than with a TAC split. In this case, a TAC split would constrain the fishery and halibut mortality overall would likely be higher than if a TAC split had not occurred.

However, in the most recent years, 2004 – 2007, Pacific cod harvest in the AI was lower than 15% of the total BSAI harvest (about 13.0%). Thus, establishing an AI TAC at 15% of the BSAI TAC would require the industry to harvest more in the AI than they would otherwise without a TAC split. In this case, overall halibut mortality would likely be lower than if a TAC split had not occurred.

While the decision to split the BSAI TAC into separate area TACs is not part of this discussion paper, the data provide a limited analysis of the possible effects of such a future decision. In sum, overall halibut mortality rates may be negatively affected if the specified AI TAC would constrain the fishing industry's AI harvests compared to status quo. Based on the most recent historical data series, it appears that the projected AI TAC would not be constraining compared to the current situation in which there is no limit on the amount of the total BSAI Pacific cod TAC that can be harvested in the AI, but would require the industry to harvest more in the AI than they would otherwise without a TAC split. In addition, a TAC split would likely require sectors that often exhibit a higher halibut mortality rate in the AI compared to the BS, such as the hook-and-line sectors, to fish a portion of their overall allocation in the AI when they might not otherwise choose to do so.

1.9 Preliminary analysis of the alternatives

1.9.1 Alternative 1: No action

Under Alternative 1, a methodology to apportion the BSAI Pacific cod allocations to the jig, trawl, and fixed gear sectors between the BS and AI areas would not be selected. However, the only approach that could be implemented without a new regulatory amendment is an equal percentage of both the BS and AI area TAC by sector. The implications of that potential action are described under Alternative 3.

Alternative 1 effectively means that the Council would explicitly not select a method of apportioning by area the numerous sector allocations determined under Amendment 85 that were established for the entire BSAI area. In the event the BSAI TAC is split by area in the future, it is likely that NMFS would have to implement equal percentages of each sector's BSAI allocation in each area (e.g., if a sector receives a 40% BSAI allocation, it would receive 40% in the BS and 40% in the AI upon a TAC split) under the current regulations. It is likely that this management system would not be satisfactory to most participants, as it would not reflect each sector's recent harvest history by area (see Table 6 above). In general, the trawl sectors have increased the percentage of their total harvest taken from the AI in recent years, and the fixed gear sectors have reduced their share in the AI.

Thus, Alternative 1 may effectively mean that a separate, new regulatory amendment would be initiated following the TAC split, in order to allocate each sector's BSAI allocation by area in a manner that reflects recent harvest patterns. The primary intent of the proposed action is provide direction in the regulations prior to separate TACs being issued in the annual specifications process, in order to avoid expediting an analysis to mitigate these circumstances. As the action would require notice and comment rulemaking under the current amendment process, it would likely require a minimum of six months to a year to implement new area sector allocations.

1.9.2 Alternative 2: Sector allocations remain BSAI

Under Alternative 2, sectors would not be allocated a specific percentage of the individual AI TAC or BS TAC. Instead, sectors would continue to be issued their current BSAI Pacific cod allocation (determined under Amendment 85), and that allocation could be harvested anywhere in the BSAI. In effect, a sector's allocation could be fished from either the BS or AI, as long as TAC was available in that area and the area was open to directed Pacific cod fishing. Once the Pacific cod TAC for either the BS or AI was reached, NMFS would issue a closure notice and all sectors would be required to stop directed Pacific cod fishing in the closed area. The sectors would then only be permitted to continue directed fishing in the open area.

This alternative provides the greatest flexibility for sectors and may be the simplest alternative for inseason management to monitor. NMFS would not be required to manage two separate area allocations for each of the nine sectors. They would instead be required only to monitor each sector's overall BSAI allocation and a single harvest limit for each area, using the existing tools to open and close fisheries. Alternative 2 would also provide maximum flexibility to the fleet since the sectors would be able to fish in either area if it was open. Thus, regardless of historical harvest patterns, sectors could move in and out of an area as desired on an inseason or annual basis, and focus their efforts in the area in which they can optimize their harvest at that point in time. Thus, while some sectors have not had substantial participation in the AI in the past, if this area became more advantageous due to shifts in the stock or a desire to deliver to a new port, these sectors would be able to shift more of their fishing to the AI. Note, however, that only vessels with an AI endorsement on their LLP would be eligible to fish in the AI under any of the alternatives.

Under Alternative 2, it is assumed that each sector would attempt to fish in its preferred area first, especially if that area is the most constrained by TAC, such as the Aleutian Islands. A possible disadvantage of this alternative is that it could cause sectors (both within sectors and among sectors) to race for Pacific cod in the area they expect to close first. This could affect a sector's ability to rationalize their harvest, especially if some members of the sector wanted to fish the area that is expected to close later in the year. The sectors that operate under a cooperative structure (e.g., the AFA sectors and the non-AFA trawl CP sector) will manage their sector's Pacific cod harvest through internal agreements and thus will be much better positioned to strategize and fish in the area they expect to close first.

The level of risk in creating a race for fish in the AI under Alternative 2 is difficult to characterize; it is speculative and dynamic, depending on each sector's participation in the AI each year. As stated previously, the best estimate of long-term average biomass distribution is 85% in the BS and 15% in the AI. During the past thirteen years for which data is available (1995–2007), the AI share of BSAI Pacific cod retained harvest was about 13%, and the BS share was 87%. This same harvest distribution between areas has also occurred during the most recent four years (2004 – 2007). Under this long-term (and short-term) average, it does not appear that a race for fish in the AI would be inevitable. However, the annual share taken in the AI has ranged from a low of 5% (1995) to a high of 20% (2001) during 1995–2007 (see Table 2). Thus, while the average share taken in the AI does not exceed the 15% projected split, some individual years have exceeded 15%.

Generally, the trawl sectors have increased their share of AI harvest as a percentage of their overall BSAI harvest and the fixed gear sectors have decreased their share of AI harvest as a percentage of their overall BSAI harvest, in the past several years. As stated above, because three of the four trawl sectors (AFA and non-AFA CP sectors) operate, or will operate, under a cooperative structure, these sectors should be better positioned to manage their harvest between areas within their respective sectors. If the AI is expected to close first, Alternative 2 may result in the trawl sectors fishing first in the AI, in order to ensure their historical level of harvest in the AI. Since the trawl sectors generally have been increasing their harvest in the AI, this may mean that the race for fish in the AI may be an issue among the trawl sectors more so than with or among the fixed gear sectors. At the same time, with the exception of the non-AFA trawl CV sector, the trawl sectors are better able to plan their fishing year and react to closures than the sectors operating under a limited access regime.

Additionally, as noted Section 1.5, NMFS has expressed some concern with this alternative relative to the 2001 Biological Opinion, and the same concerns would apply under the upcoming 2009 Biological Opinion. Because Alternative 2 does not establish sector allocations in each area, there are thus no gear specific seasonal apportionments by area. While the overall guideline for the BSAI in the 2001 BiOp is a 70%–30% seasonal split, the seasonal apportionments vary by gear type. Thus, absent specific sector allocations in the AI, if any gear type was allowed to fish in the AI until the TAC was taken, this approach risks harvesting all of the AI TAC in the first half of the year. No guidelines currently exist for establishing AI seasonal apportionments by gear type or overall. Thus, NMFS is concerned that this alternative deviates from what was consulted on in the 2001 BiOp, and what is currently being consulted on in the 2009 BiOp.

Overall, Alternative 2 is likely to be the least disruptive to the BSAI Pacific cod fleet compared to Alternatives 3 and 4. Alternative 2 provides maximum flexibility for the sectors to change their fishing patterns in reaction to a shifting stock, preferable fishing location, or market conditions. As sector allocations are apportioned into separate areas and then further divided into seasons (as proposed under Alternative 3 and 4), flexibility declines and the potential for sector disruption increases.

1.9.3 Alternative 3: Equal percentages in BS and AI

Alternative 3 would allocate sectors the same percentage of each BS and AI TAC that the sector currently receives in the BSAI. . For example, as the hook-and-line CP sector is allocated 48.7% of the BSAI Pacific cod ITAC, this sector would be allocated 48.7% of the BS ITAC and 48.7% of the AI ITAC. Note that this alternative also reflects the default scenario under the current regulations, should the Council choose to take no action (Alternative 1).

Table 11 shows the range of existing BSAI allocations for each sector, and the annual average of each sector's BSAI harvest that was taken in the BS and AI during 2000–2007. **In effect, under Alternative 3, each sector would be allowed 85% of its BSAI Pacific cod allocation in the Bering Sea and 15% of**

its BSAI Pacific cod allocation in the AI, using the stock assessment projections of an 85%–15% split between areas. Refer to the last two columns in Table 11 to compare the proposed split and each sector's historical split as a percentage of its annual average BSAI Pacific cod harvest.

Table 11 Percentage of BSAI Pacific cod harvest taken in BS and AI by sector, average 2000–2007

Sector	BSAI allocations under AM 85 (% of P. cod ITAC)	% of sector's BSAI cod allocation allocated to BS	% of sector's BSAI cod allocation allocated to AI	% of sector's BSAI cod harvest in BS, Avg. 2000–2007	% of sector's BSAI cod harvest in AI, Avg. 2000–2007
AFA trawl CP	2.3%	85%	15%	*	*
Non-AFA trawl CP	13.4%	85%	15%	71.5%	28.5%
Hook-and-line CP	48.7%	85%	15%	94.4%	5.6%
Pot CP	1.5%	85%	15%	92.0%	8.0%
Trawl CV	22.1%	85%	15%	67.7%	32.3%
Hook-and-line CV ≥60'	0.2%	85%	15%	75%	25%
Pot CV ≥60'	8.4%	85%	15%	97.2%	2.8%
<60' fixed gear	2.0%	85%	15%	*	*
Jig CV	1.4%	85%	15%	90.3%	9.7%

Source: NPFMC Database (table 4&5.xls)
*Not shown due to restrictions on confidential data

Table 11 shows that most sectors' recent harvest patterns in the BS and AI do not exactly mirror an 85% (BS) and 15% (AI) split. With the exception of the hook-and-line CV ≥ 60' sector, all other the fixed gear sectors harvested 90% to 98% of their harvest in the BS during the past several years (2000–2007). However, the trawl sectors harvested noticeably less than 85% of their total harvest in the BS during this time period: non-AFA trawl CP sector – 72%; trawl CV sector – 68%. In general, the individual trawl sectors have increased the percentage of their total retained BSAI cod catch harvested in the AI during 2000 – 2007, and the fixed gear sectors have taken less of their total retained BSAI cod catch from the AI during this same period.

Table 12 provides the potential BS and AI allocations by sector, by converting percentage allocations to metric tons, based on the 2008 BSAI Pacific cod ITAC and the projected split of 85% (BS) and 15% (AI). The first data column provides the BSAI allocations to each sector from Amendment 85. These represent percentage shares of the BSAI Pacific cod ITAC. The next column provides the projected BS allocation to that sector under Alternative 3, followed by the average annual BS Pacific cod harvest by that sector in 2000–2007. Finally, the last two columns show the same information by sector for the AI.

Table 12 Projected BS and AI allocations by sector under Alternative 3, using the 2008 BSAI Pacific cod ITAC and the allocations from Amendment 85

Sector	Allocation under AM 85 (% of BSAI Pcod ITAC)	Estimation of BS allocation using 2008 ITAC (mt)	Average annual BS cod retained harvest (mt) 2000-2007	Estimation of AI allocation using 2008 ITAC (mt)	Average annual AI cod retained harvest (mt) 2000-2007
AFA trawl CP	2.3%	2,980	*	526	*
Non-AFA trawl CP	13.4%	17,364	20,953	3,064	8,344
Hook & line CP	48.7%	63,108	78,220	11,137	4,609
Pot CP	1.5%	1,944	2,476	343	215
Trawl CV	22.1%	28,638	23,497	5,054	11,219
Hook & line CV>60'	0.2%	259	234	46	78
Pot CV>60'	8.4%	10,885	13,043	1,921	372
<60' fixed gear	2.0%	2,592	*	457	*
Jig CV	1.4%	1,814	112	320	12

Source: NPFMC Database (table 4&5.xls)
Note: The 2008 BSAI Pacific TAC = 170,720 mt. Applying a 10.7% CDQ allocation results in a BSAI ITAC = 152,453 mt. This also accounts for the 3% State water AI fishery.
The BS/AI TAC split is projected to be 85% and 15% AI, which means the projected BS ITAC = 129,585 mt and the AI ITAC = 22,868 mt.
*Not shown due to restrictions on confidential data

Note that Table 12 uses the 2008 BSAI Pacific cod TAC of 170,720 mt[4], and assumes the 85% (BS) and 15% (AI) split occurs in the future to determine the projected BS and AI TACs. In effect, 10.7% is removed from the BS and AI TACs for the CDQ Program, in order to determine the ITACs allocated among the various (non-CDQ) sectors.

Table 12 compares the potential BS and AI allocations to each sector under Alternative 3 to each sector's average annual harvest in the BS and AI. With the exception of the pot CP and hook and line CV > 60' sectors, the remaining fixed sectors, estimated allocation would be more than 50% higher than the annual average harvest by sector in the AI (2000–2007). In hook-and-line CP sector, for example, the AI allocation would be more than 200% higher, and in the pot CV sector the AI allocation would be more than 400% higher than the recent harvest. In the trawl sectors, the opposite is true; generally, the AI allocation to each sector is more than 35% lower than the annual average harvest by trawl sector in the AI (2000–2007). In the non-AFA trawl CP and trawl CV sectors in particular, the estimate of the AI allocation would be 37% and 45% lower than the recent harvest in that area.

The problem statement for the proposed action references the need to recognize differences in dependence among gear groups and sectors that harvest Pacific cod in the BS and AI management areas. While Alternative 3 would mitigate the problem of disproportionate impacts that result from TAC fluctuations, it may force vessels to fish in areas they have very limited historical participation and do not want to fish. This issue impacts all sectors, but would likely be most onerous on the sectors comprised of smaller vessels, as they would be required to travel greater distances to fish in conditions that may not be well suited for their vessels.

In general, Alternative 3 is likely to be the most disruptive to the BSAI Pacific cod fleet of the alternatives considered in this action. The alternative would apportion Pacific cod into area and seasonal bins thus reducing the flexibility of the fleet. In addition, Alternative 3 does not result in an allocation scheme between the two areas that reflects current harvest patterns by sector. In general, Alternative 3 would allocate a lower share of the trawl sectors' BSAI allocations to the AI than has been harvested in the AI in the recent past. In contrast, Alternative 3 would allocate a higher share of the fixed gear sectors' BSAI

[4] Excludes 3% deduction for State water AI Pacific cod fishery.

allocations to the AI than has been harvested in the AI in recent years. In sum, Alternative 3 does not appear to meet the concerns described in the problem statement.

1.9.4 Alternative 4: AI allocation based on historic harvest

In February 2006, while this action was still part of Amendment 85, the Council identified Alternative 4 as the preliminary preferred alternative for how to apportion the various BSAI Pacific cod allocations between the BS and the AI. Alternative 4 would define the sector allocations for each area based on the relative percentages of Pacific cod that were harvested by the sectors during an identified series of years. Thus, the overall sector splits determined at the combined BSAI level in Amendment 85 remain in place, and the sector allocations are then calculated at the individual BS and AI level. Alternative 4 divides the Aleutian Islands ITAC among the sectors based upon each sector's relative historic harvest in the Aleutian Islands. The remainder of each sector's overall BSAI allocation is allocated in the Bering Sea, after accounting for the respective allocation for the Aleutian Islands.

This alternative allows the BSAI sector allocations to be maintained, but sectors would be allocated different percentages of each area based on their historic harvest patterns in the AI. It also allows the overall BSAI allocations to each sector to be based on a different series of years than the years on which the AI allocations are based. The Council may want to base the AI sector allocations on more recent years than the overall BSAI sector allocations, in order to reflect each sector's recent dependency on the AI.

The general intent under Alternative 4 is thus to base the percentage AI allocations for each sector on recent harvest shares in the AI. In the case that the Council chooses an option under Alternative 4 as its preferred alternative, and a BSAI TAC split between the BS and AI does not occur for several years, it may be preferable at that time to consider whether the preferred alternative continues to reflect recent AI harvest shares by sector. For instance, if the harvest distribution between the BS and AI changes dramatically for one or more sectors between now and when a TAC split occurs, the Council may want to consider initiating a new amendment to revise the sector AI allocations resulting from this part.

The original year combination options from Amendment 85 for determining each sector's allocation in the AI were as follows:

Option 1	1995–2002
Option 2	1997–2003
Option 3	2000–2003
Option 4	2002–2003

As stated in earlier sections, the trawl sectors have generally increased their share of AI harvest as a percentage of their overall BSAI harvest in the past several years. By contrast, the fixed gear sectors have generally decreased their share of AI harvest as a percentage of their overall BSAI harvest in the past several years. Because of this variation in AI harvest by sectors, the time period selected for the allocations largely determines whether certain fixed gear sectors, primarily the pot sectors and the hook-and-line CV sector, will be significant participants in the AI Pacific cod fishery in the future. Other sectors would also be impacted by the years selected as the historic base period, but in most cases would be less likely to be effectively excluded from the AI fishery.

The calculations for the AI harvest by sector under Alternative 4 are made using the four options above. In completing the allocation calculations, it was necessary to make several adjustments to overcome potential problems with confidential data. It was necessary to combine the <60' hook-and-line and pot catcher vessel sector with the jig catcher vessel sector. The estimates for all other sectors are unaffected,

as this calculation was only undertaken for the AFA trawl catcher processor and non-AFA trawl catcher vessel sectors.

The first step in evaluating the Aleutian Islands and Bering Sea allocations resulting from the options under Alternative 4 was to calculate each sector's AI historic retained Pacific cod harvest share, as a percentage of the historical AI harvests for all CV and CP sectors, during the years identified. These estimates are show in Table 13. Table 14 shows the same data but includes fish meal destined for production. The first column for each option shows the retained catch of Pacific cod in the Aleutian Islands by each sector during the years specified in the options, while the second column shows the percent of the total Aleutians Islands retained catch by the sector during that period.

Table 13 Aleutian Islands Pacific cod catch (mt) and percent of the total Aleutian Islands allocation to each sector under Alternative 4, Options 1–4 (meal not included)

	1995-2002		1997-2003		2000-2003		2002-2003	
Sector	mt	percent	mt	percent	mt	percent	mt	percent
<60 HAL/Pot CVs and Jig CVs	*	*	*	*	*	*	33	0.1%
AFA Trawl CPs	*	*	*	*	*	*	*	*
Trawl CVs	45,158	26.17%	60,986	35.1%	49,029	41.7%	32,122	56.5%
Longline CPs	56,230	32.59%	49,059	28.2%	27,072	23.1%	2,518	4.4%
Longline CVs	261	0.15%	245	0.1%	615	0.5%	5	0.0%
Non-AFA Trawl CPs	39,979	23.17%	41,956	24.1%	32,275	27.5%	20,278	35.7%
Pot CPs	7,912	4.59%	3,753	2.2%	1,500	1.3%	*	*
Pot CVs	6,825	3.96%	5,226	3.0%	2,585	2.2%	*	*
Denominator	172,526		173,757		117,461		56,824	

Source: NPFMC database (Pcod tables Jan 07.xls and catch data-1.xls)
*Not shown due to restrictions on confidential data

Table 14 Aleutian Islands Pacific cod catch (mt) and percent of the total Aleutian Islands allocation to each sector under Alternative 4, Options 1–4 (meal included)

	1995-2002		1997-2003		2000-2003		2002-2003	
Sector	mt	percent	mt	percent	mt	percent	mt	percent
<60 HAL/Pot CVs and Jig CVs	*	*	*	*	*	*	35	0.1%
AFA Trawl CPs	*	*	*	*	*	*	*	*
Trawl CVs	42,221	24.46%	61,051	35.1%	49,065	41.8%	32,126	56.5%
Longline CPs	56,230	32.57%	49,059	28.2%	27,094	23.1%	2,518	4.4%
Longline CVs	264	0.15%	247	0.1%	617	0.5%	5	0.0%
Non-AFA Trawl CPs[1]	39,979	23.16%	41,956	24.1%	32,301	27.6%	20,278	35.7%
Pot CPs	7,912	4.58%	3,753	2.2%	1,500	1.3%	*	*
Pot CVs	6,825	3.95%	5,226	3.0%	2,591	2.2%	*	*
Denominator	172,643		173,878		117,509		56,831	

Source: NPFMC database (Pcod tables Jan 07.xls and catch data-1.xls)
*Not shown due to restrictions on confidential data

Recall that each sector's overall BSAI allocation is maintained under Alternative 4. Thus, to represent the AI percentage estimates above as a potential allocation to each sector in the following tables requires the use of the existing BSAI allocations (from Amendment 85).

Table 15 and Table 16 show estimated allocations with and without meal under Option 1. The remaining tables show estimated allocations without meal. Only those options under Alternative 4 that include 1995-1997 for catch history would be impacted by the inclusion of fish meal in the catch data. The impact of

including fish meal in the calculations could result in the AFA CP sector receiving less than a .5% higher portion of its BSAI Pacific cod allocation in the AI and the Trawl CV sector, which would receive slightly higher than 1% higher portion of its allocation in the BS. As a result, the tables for Option 2, 3, and 4 do not include meal.

Looking specifically at Table 15, the first column shows the BSAI allocation to each sector, as a percent of the BSAI ITAC. The second column shows the estimated allocation to each sector in metric tons, based on a 2008 BSAI ITAC of 152,453 mt. The third column shows the Aleutian Islands allocation to each sector, as a percent of the Aleutian Islands ITAC, based on Option 1. The third column shows each sector's Aleutian Islands allocation in metric tons, based on a projected Aleutian Islands ITAC of 22,868 mt. The fourth column shows each sector's remaining Bering Sea allocation in metric tons (i.e., each sector's overall BSAI allocation minus its AI allocation). The last two columns show the respective percentages of each sector's total BSAI allocation that is from the BS and the AI, based on the previous estimates. In reviewing this table, it is important to bear in mind that the division of a sector's allocation between the BS and AI will vary annually with the respective ITACs.

Table 15 Example of BSAI, AI, and BS allocations by sector without meal using 1995–2002 catch history

Sector	BSAI allocation (as percent of ITAC)	BSAI allocation (mt)	AI allocation (as percent of ITAC -1995-2002)	AI allocation (mt)	BS allocation (mt) (remaining portion of sector's allocation)	BS allocation (as percent of sector BSAI allocation)	AI allocation (as percent of sector BSAI allocation)
<60 HAL/Pot CVs and Jig CVs	3.4%	4,406	0.3%	60	4,345	98.6%	1.37%
AFA Trawl CPs	2.3%	2,980	9.1%	2,082	899	30.2%	69.84%
Trawl CVs	22.1%	28,638	26.2%	5,986	22,653	79.1%	20.90%
Longline CPs	48.7%	63,108	32.6%	7,453	55,655	88.2%	11.81%
Longline CVs	0.2%	259	0.2%	35	225	86.6%	13.36%
Non-AFA Trawl CPs	13.4%	17,364	23.2%	5,299	12,065	69.5%	30.52%
Pot CPs	1.5%	1,944	4.6%	1,049	895	46.0%	53.95%
Pot CVs	8.4%	10,885	4.0%	905	9,980	91.7%	8.31%

Source: NPFMC database (Pcod tables Jan 07.xls)
Example assumes a projected 2008 BS ITAC of 129,585 mt and AI ITAC of 22,868 mt. This accounts for the 3% State water AI fishery and the 10.7% CDQ allocation.

Table 16 Example of BSAI, AI, and BS allocations by sector with meal using 1995–2002 catch history

Sector	BSAI allocation (as percent of ITAC)	BSAI allocation (mt)	AI allocation (as percent of ITAC - 1995-2002)	AI allocation (mt)	BS allocation (mt) (remaining portion of sector's allocation)	BS allocation (as percent of sector BSAI allocation)	AI allocation (as percent of sector BSAI allocation)
<60 HAL/Pot CVs and Jig CVs	3.4%	4,406	0.3%	60	4,345	98.6%	1.37%
AFA Trawl CPs	2.3%	2,980	9.1%	2,087	893	30.0%	70.02%
Trawl CVs	22.1%	28,638	24.5%	5,593	23,046	80.5%	19.53%
Longline CPs	48.7%	63,108	32.6%	7,448	55,660	88.2%	11.80%
Longline CVs	0.2%	259	0.2%	35	224	86.5%	13.47%
Non-AFA Trawl CPs	13.4%	17,364	23.2%	5,296	12,069	69.5%	30.50%
Pot CPs	1.5%	1,944	4.6%	1,048	896	46.1%	53.92%
Pot CVs	8.4%	10,885	4.0%	904	9,981	91.7%	8.31%

Source: NPFMC database (Pcod tables Jan 07.xls)
Example assumes a projected 2007 BS ITAC of 129,585 mt and AI ITAC of 22,868 mt. This accounts for the 3% State water AI fishery and a 10.7% CDQ allocation.

Table 17 Example of BSAI, AI, and BS allocations by sector without meal using 1997–2003 catch history

Sector	BSAI allocation (as percent of ITAC)	BSAI allocation (mt)	AI allocation (as percent of ITAC -1997-2003)	AI allocation (mt)	BS allocation (mt) (remaining portion of sector's allocation)	BS allocation (as percent of sector BSAI allocation)	AI allocation (as percent of sector BSAI allocation)
<60 HAL/Pot CVs and Jig CVs	3.4%	4,406	0.3%	62	4,344	98.6%	1.40%
AFA Trawl CPs	2.3%	2,980	6.9%	1,588	1,393	46.7%	53.27%
Trawl CVs	22.1%	28,638	35.1%	8,026	20,612	72.0%	28.03%
Longline CPs	48.7%	63,108	28.2%	6,457	56,651	89.8%	10.23%
Longline CVs	0.2%	259	0.1%	32	227	87.6%	12.44%
Non-AFA Trawl CPs	13.4%	17,364	24.1%	5,522	11,843	68.2%	31.80%
Pot CPs	1.5%	1,944	2.2%	494	1,450	74.6%	25.41%
Pot CVs	8.4%	10,885	3.0%	688	10,197	93.7%	6.32%

Source: NPFMC database (Pcod tables Jan 07.xls)
Example assumes a projected 2007 BS ITAC of 129,585 mt and AI ITAC of 22,868 mt. This accounts for the 3% State water AI fishery and a 10.7% CDQ allocation.

Table 18 Example of BSAI, AI, and BS allocations by sector without meal using 2000–2003 catch history

Sector	BSAI allocation (as percent of ITAC)	BSAI allocation (mt)	AI allocation (as percent of ITAC - 2000-2002)	AI allocation (mt)	BS allocation (mt) (remaining portion of sector's allocation)	BS allocation (as percent of sector BSAI allocation)	AI allocation (as percent of sector BSAI allocation)
<60 HAL/Pot CVs and Jig CVs	3.4%	4,406	0.2%	46	4,360	98.9%	1.05%
AFA Trawl CPs	2.3%	2,980	3.5%	803	2,177	73.0%	26.95%
Trawl CVs	22.1%	28,638	41.9%	9,581	19,058	66.5%	33.45%
Longline CPs	48.7%	63,108	23.1%	5,290	57,818	91.6%	8.38%
Longline CVs	0.2%	259	0.2%	43	217	83.5%	16.46%
Non-AFA Trawl CPs	13.4%	17,364	27.6%	6,307	11,058	63.7%	36.32%
Pot CPs	1.5%	1,944	1.3%	293	1,651	84.9%	15.08%
Pot CVs	8.4%	10,885	2.2%	505	10,380	95.4%	4.64%

Source: NPFMC database (Pcod tables Jan 07.xls)
Example assumes a projected 2007 BS ITAC of 129,585 mt and AI ITAC of 22,868 mt. This accounts for the 3% State water AI fishery and a 10.7% CDQ allocation.

Table 19 Example of BSAI, AI, and BS allocations by sector without meal using 2002–2003 catch history

Sector	BSAI allocation (as percent of ITAC)	BSAI allocation (mt)	AI allocation (as percent of ITAC - 2002-2003)	AI allocation (mt)	BS allocation (mt) (remaining portion of sector's allocation)	BS allocation (as percent of sector BSAI allocation)	AI allocation (as percent of sector BSAI allocation)
<60 HAL/Pot CVs and Jig CVs	3.4%	4,406	0.1%	26	4,380	99.4%	0.58%
AFA Trawl CPs	2.3%	2,980	3.3%	747	2,234	74.9%	25.06%
Trawl CVs	22.1%	28,638	56.5%	12,927	15,711	54.9%	45.14%
Longline CPs	48.7%	63,108	4.4%	1,012	62,096	98.4%	1.60%
Longline CVs	0.2%	259	0.0%	2	257	99.3%	0.70%
Non-AFA Trawl CPs	13.4%	17,364	35.6%	8,150	9,214	53.1%	46.94%
Pot CPs	1.5%	1,944	*	*	*	*	*
Pot CVs	8.4%	10,885	*	*	*	*	*

Source: NPFMC database (Pcod tables Jan 07.xls)
*Not shown due to restrictions on confidential data
Example assumes a projected 2007 BS ITAC of 129,585 mt and AI ITAC of 22,868 mt. This accounts for the 3% State water AI fishery and a 10.7% CDQ allocation.

Because the fixed gear sectors have been taking less of their total Pacific cod harvest in the AI in the most recent years, and because all of the fixed gear sectors except for the hook-and-line CP sector receive a relatively small percentage of the overall BSAI ITAC, using the most recent years proposed (2002–2003) to determine the AI allocations will result in relatively small allocations to these sectors under every allocation scenario. This result may not represent a concern to these sectors, unless and until they desire to increase their Pacific cod share in the AI in the future.

In summary, if the Council wants to mirror the most recent sector shares of the AI Pacific cod harvest, it may want to 1) include series of years that are more recent than 2003; and/or 2) choose percentages that fall within the range provided under Options 1–4. Selecting AI percentage allocations to each sector that fall within the range analyzed would allow the Council to choose percentages that do not result in a negative BS allocation to each sector under the current projected TAC levels, but could also provide for an AI allocation that mirrors the most recent harvest levels by sector in that area. However, as pointed out at the April 2006 Council meeting, because 1) the BSAI TAC split has not yet occurred, 2) it is uncertain how TACs in the BS and AI would fluctuate relative to one another in the future, and 3) the BS and AI allocations under Alternative 4 are dependent first on maintaining the overall BSAI allocation to each sector, **it is possible that Alternative 4 could result in negative allocations in the BS for one or more sectors.** This is because the BSAI allocation by sector is established in Federal regulation, and does not vary each year (unless a new regulatory amendment is approved). Each sector's percentage share of the AI ITAC also would be established in regulation. The actual allocation (in metric tons) would vary depending on the AI ITAC. **Thus, it is possible, depending on TAC fluctuations, that a sector could have an AI allocation that is greater (in mt) than its overall BSAI allocation.** If the Council wants to provide for this concern, the following language could potentially be added under Alternative 4:

If, in a particular year, the AI allocation to a sector is greater than the BSAI allocation to that sector, set the sector's AI allocation equal to the sector's BSAI allocation and set the BS allocation equal to zero. All other sector AI allocations would be adjusted (increased) proportionately to allocate the full AI ITAC.

Also noted at the April 2006 Council meeting, Alternative 4 could result in sectors having no allocation in the Bering Sea, and all of the allocation in the Aleutian Islands. Recall from Table 1 that in many sectors, including the non-AFA trawl CV sector, the majority of the LLPs are endorsed only for the Bering Sea area. In the case of the non-AFA trawl CV sector, there are 50 valid LLPs, and only 6 have AI endorsements[5]. Thus, selecting an allocation option that would result in no allocation in the Bering Sea could severely affect the ability of eligible vessels to continue participating in this sector for Pacific cod. While the tables indicate that other sectors, such as the smaller fixed gear sectors, could receive a relatively small BSAI allocation, there is less likely the possibility for a negative or zero BS allocation as a result of Alternative 4 since these sectors have taken very little of their overall harvest in the AI in 2002 and 2003.

In addition, the AI allocations would also be seasonally apportioned, resulting in extremely small AI seasonal allocations to some sectors. Thus, implementing BS and AI allocations for each of nine sectors of the Pacific cod fishery may be more difficult to manage than it appears on an aggregate gear level. However, in such case that (1) there exist relatively small allocations to most of the fixed gear sectors with the exception of the hook-and-line CP sector; and (2) seasonal apportionments of the AI allocations are implemented, the result is very small allocations to particular, non-rationalized sectors (e.g., non-AFA

[5] Note that once implemented, Amendment 92 would reduce the number of trawl CV groundfish licenses endorsed for the BS by 33 and reduce the number of AI endorsed licenses by 5. In addition, this action will also create 12 new AI endorsements for use on existing non-AFA trawl CV licenses in the Aleutian Islands.

trawl CV, <60' fixed gear, hook-and-line CV, and pot CP sectors). This effect is exacerbated as the overall BSAI TAC declines. It is thus possible that some sector AI allocations will be so small that inseason management could not open a directed fishery, particularly for sectors that operate under an open access system, as opposed to a cooperative system.

Overall, Alternative 4 is likely to be more disruptive to, and less flexible for, the BSAI Pacific cod fleet compared to Alternative 2.. However, all options under Alternative 4 are based on a sector's actual AI harvest, so Alternative 4 is assumed to be less disruptive to the fleet than Alternative 3.

1.9.5 October 2006 Council added Option

The Council, at the October 2006 meeting, added a new option to each of the alternatives that would make separate BS and AI LLP area endorsements a single BSAI area-wide endorsement for the Pacific cod fishery. This option would give all groundfish vessels that have historically operated only in the BS, an AI endorsement, despite the lack of catch history in the AI. The purpose of this option is to allow sectors with a Pacific cod apportionment in the AI, but limited AI endorsements, the ability to harvest their AI apportionment. In addition, some industry participants are also concerned that with separate BS and AI TACs, the BS Pacific cod fishery could potentially close earlier than it would under a combined TAC. For those Bering Sea participants that historically fished for Pacific cod later in the year, an early closure could potentially result in some participants reexamining their fishery options.

The most obvious effect of this option would be increase the number of AI endorsements by 252 and the number of BS endorsements by 6 (see Table 1[6]). The sectors that will receive the most new AI endorsements are the AFA trawl CV sector at 60 new endorsements, non-AFA Trawl CV sector at 44 new endorsements, pot CV ≥60' at 47 new endorsements, and the hook-and-line/pot <60' at 87 new endorsements.

As noted above, the primary reason the Council added the new option was because of concerns that some sectors could be constrained in their ability to harvest their AI sector cod allocation. However, the new option would only be effective in addressing the Council's concern if Alternative 3 were selected. Alternative 2 would have separate TACs for the BS and AI, but apportionments at the sector level would remain BSAI-wide, thus, creating new endorsements should not be necessary. Under Alternative 4, the apportionment of Pacific cod would be based on historic catch patterns in each of the areas, reducing the probability of a sector getting an unreasonable portion of their sector allocation in one area without the ability to harvest the allocation. Thus, creating new area endorsements should not be necessary under Alternative 4. However, under Alternative 3, sector allocations of Pacific cod would **not** be apportioned based on historic fishing in the AI or BS, but instead would be based on an equal percentage in both BS and AI of the sector's combined BSAI Pacific cod allocation. In other words, if the Pot CV ≥60' sector allocation of BSAI Pacific cod is 8.4%, then the sector would be apportioned 8.4% of the AI TAC and 8.4% of the BS TAC despite the sector having very limited catch history in the AI.

Another potential effect could be an increase in the number of vessels fishing in the AI. An action that could increase the intensity of effort in the Aleutian Islands area could be considered a departure from the fishing conditions that existed at the time of the last FMP level Section 7 consultation under the Endangered Species Act. When the FMP BiOp was prepared in 2000, the Pacific cod fishery was part of a jeopardy determination, and as a consequence the Council and NMFS developed additional restrictions for that fishery (and the pollock and Atka mackerel fisheries) to remove the jeopardy determination, as provided for in the 2001 BiOp. As noted above, under the 2001 BiOp, SSL protection measures were established for the Pacific cod fishery based on how that fishery was prosecuted at that time. If those

[6] The LLP licenses in Table 1 does not take into account the 8 new AI LLP added from Amendment 92.

conditions change substantively, such as allowing in increase in effort in the Pacific cod fishery in the AI, this could be considered a significant change in the action that was considered in the 2001 BiOp (and the ongoing BiOp scheduled for release in October 2009), and this might trigger a new consultation.

In addition, the new AI endorsements could create latent trawl AI endorsements, which runs somewhat counter to the Council's action in reducing latent licenses in the BSAI in April 2008 (BSAI FMP Am. 92/82). Under the Council's preferred alternative, area endorsements (BS and AI) would be removed from trawl CV and CP licenses unless the license has at least two trawl groundfish landings during 2000 – 2006 in the endorsement area. The intent is to increase stability in the trawl sectors and protect existing participants from the possible future use of latent licenses, and thus a potential reduction in their gross revenue share due to this participation. With the Council removing the trawl latent licenses from the AI as part of the BSAI and GOA trawl LLP recency action, the addition of new trawl AI endorsements under this proposed action could once again result in latent licenses in the AI Pacific cod fishery.

In addition, this option may not be necessary given the additional AI endorsements created by the Council under Am. 92/82. Under the preferred alternative of the Trawl Recency action, an estimated 8 new AI endorsements would be earned by <60' non-AFA trawl CV licenses that met the participation criteria. These endorsements would be severable from the overall license, such that they could be transferred to other <60' non-AFA trawl CV licenses. Note that the existing LLP program does not allow an endorsement to be severed from the overall license. In addition, an estimated 4 new AI endorsements would be earned by ≥60' non-AFA trawl CV licenses that met the participation criteria. These endorsements would be not be severable and transferable. As only one of the existing 6 non-AFA trawl CV licenses with AI endorsements is estimated to qualify to retain its AI endorsement under Am. 92/82, the intent was to allow recent participants in the AI parallel or State waters cod fishery to qualify for an AI endorsement in order to participate in the new trawl limited access Atka mackerel and POP fisheries, as well as the Pacific cod fishery.

1.9.6 Summary of Alternatives

In summary, in the past, none of the existing alternatives appeared to provide a satisfactory solution to the problem, given public testimony at the April 2006 meeting and subsequent meetings. The primary concern with Alternative 1 (no action) is that it does not reflect recent historical catch by sector in the Aleutian Islands. Although Alternative 2 provides the greatest flexibility for sectors and may be the easiest for NMFS inseason management to monitor, the alternative risks creating a race for fish. The same concerns under Alternative 1 exist for Alternative 3, as they are effectively the same. Finally, Alternative 4, identified as the preliminary preferred alternative in February 2006, also has a couple areas of concern. One concern is that TAC fluctuations will have disproportionate impacts on sectors that are allocated the greatest percentage of the area with the declining TAC. A related concern is that some of the resulting AI sector allocations may not be large enough to open a directed fishery in the AI. Please see the Appendix for figures showing Alternative 3 and Alternative 4 Pacific cod allocations between the BS and AI area for each sector.

Additionally, there are no gear-specific seasonal apportionments established for the BS or AI only, which is necessary in order to implement the alternatives and may factor into a decision as to whether an alternative complies with the existing (or newly developing) Steller sea lion Biological Opinion. Alternative 2 in particular could theoretically risk harvesting the entire AI TAC in the first half of the year, absent any AI-specific seasonal allocations. A significant, and related issue, concerns the timing of this proposed action with regard to the 2009 Steller sea lion Biological Opinion that is under development. It may be difficult for the Council to develop such a Pacific cod split analysis prior to the release of the 2009 Biological Opinion (scheduled for October 2009), as new BiOp may come to different conclusions in terms of jeopardy or necessary mitigation measures in order to prevent jeopardy, than the

existing (2001 and 2003 Supplement) Biological Opinion. This makes it very difficult to simultaneously propose changes to the way in which Pacific cod is managed.

At this December 2008 meeting, the Council may determine whether to initiate an analysis to establish separate BS and AI sector allocations, should the BSAI TAC be split into separate areas at this meeting or in a future specifications process. If the analysis is initiated, the Council should determine whether the current problem statement and alternatives are sufficient for consideration. The Council may also determine not to take action at this time.

1.10 Appendix

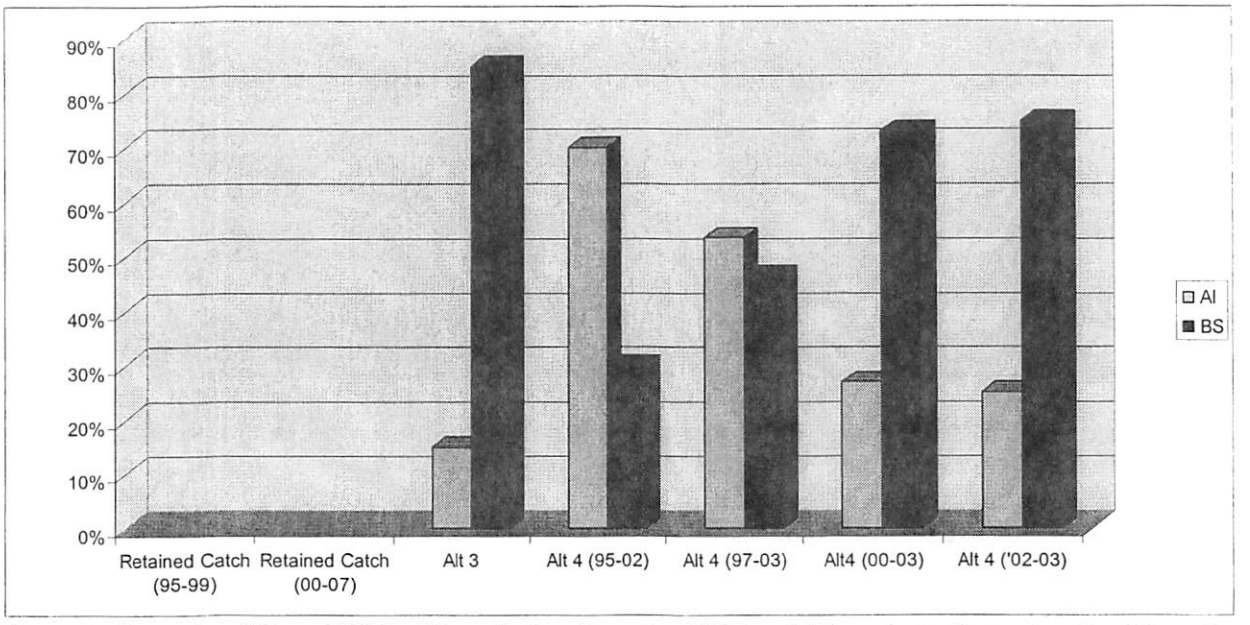


Figure 1 Example of AI and BS Pacific cod allocations for AFA trawl CP sector with meal under Alternative 3 and 4. Note retained catch data not shown due to restrictions on confidential data.

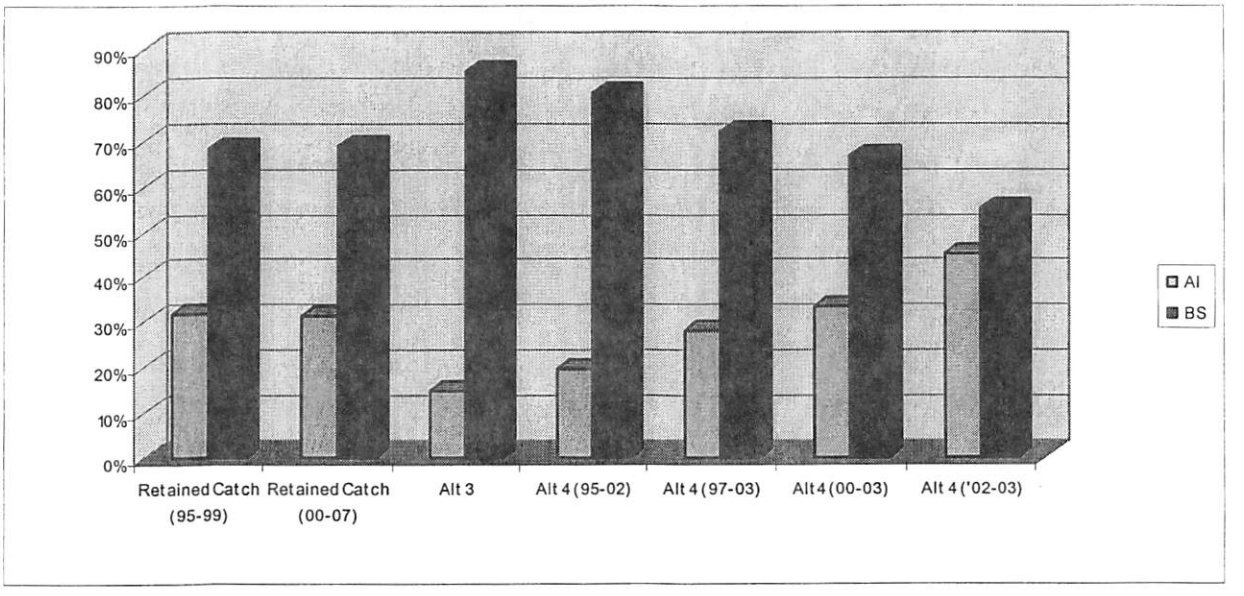


Figure 2 Example of AI and BS Pacific cod allocations for trawl CV sector with meal under Alternative 3 and 4.

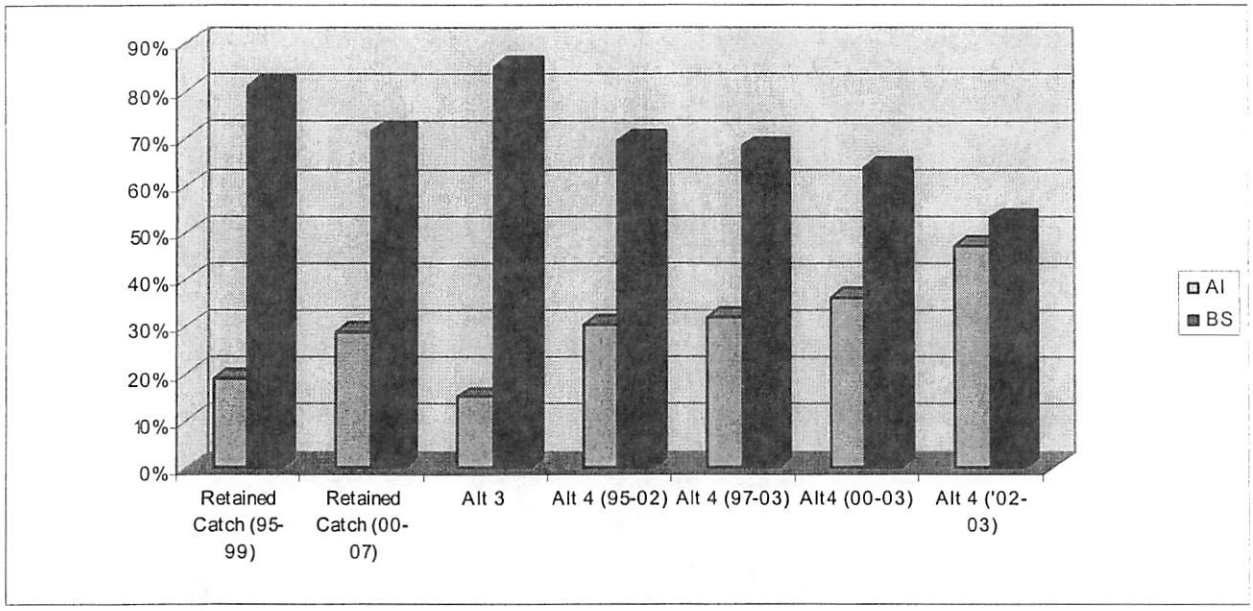


Figure 3 Example of AI and BS Pacific cod allocations for AM-80 sector with meal under Alternative 3 and 4.

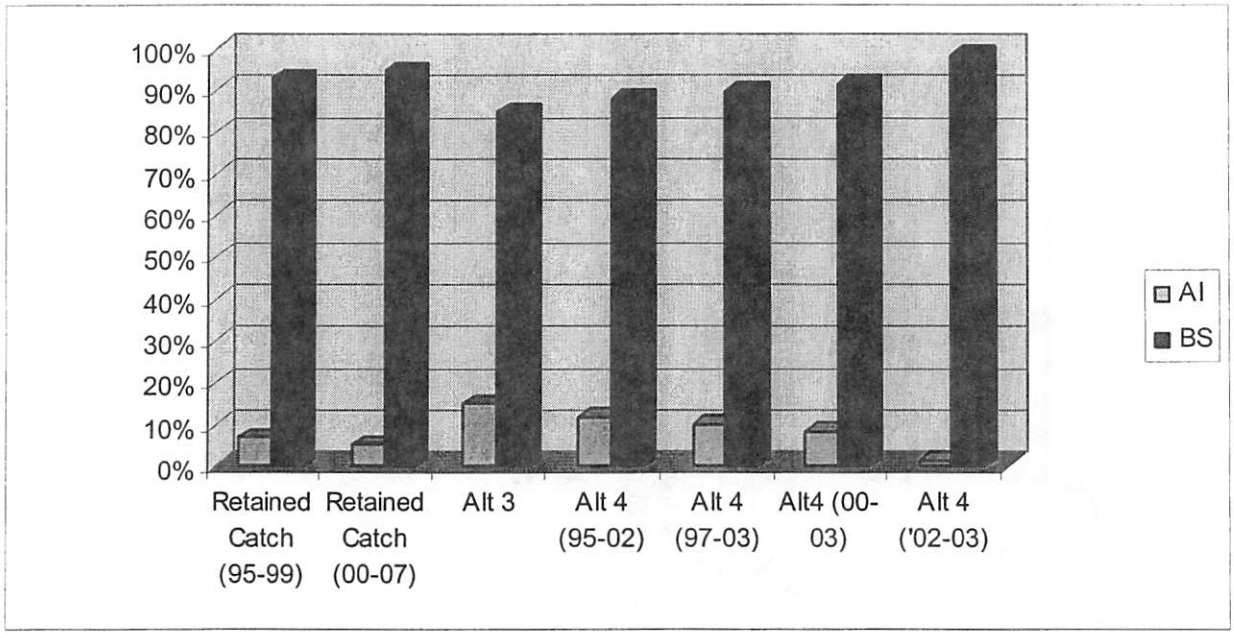


Figure 4 Example of AI and BS Pacific cod allocations for longline CP sector with meal under Alternative 3 and 4.

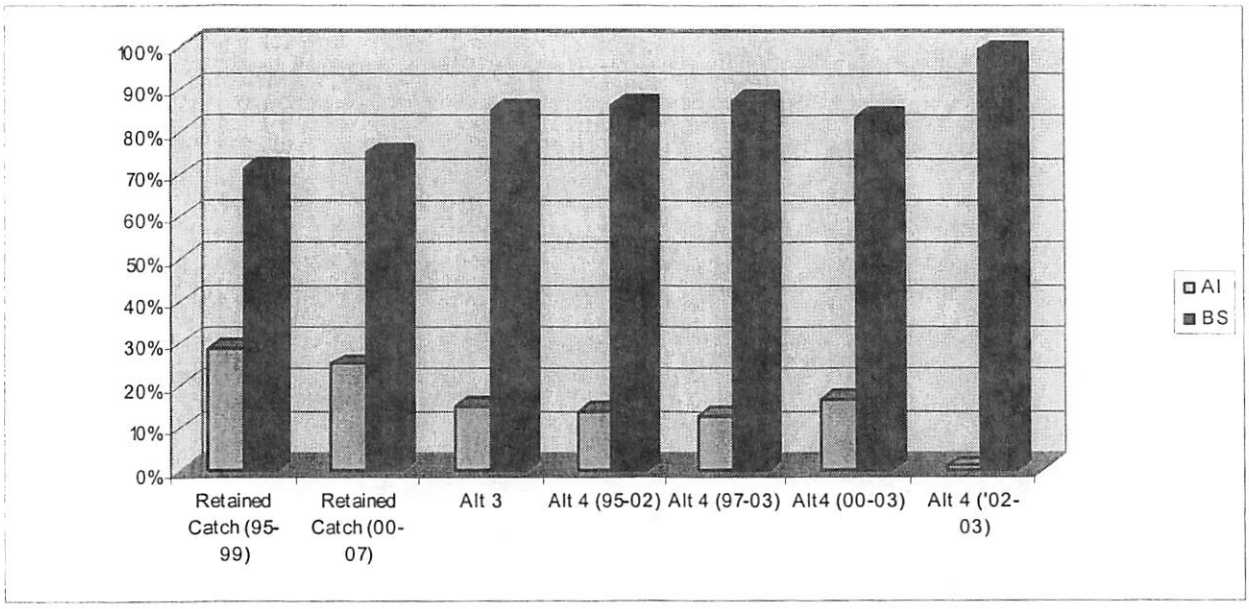


Figure 5 Example of AI and BS Pacific cod allocations for longline CV sector with meal under Alternative 3 and 4.

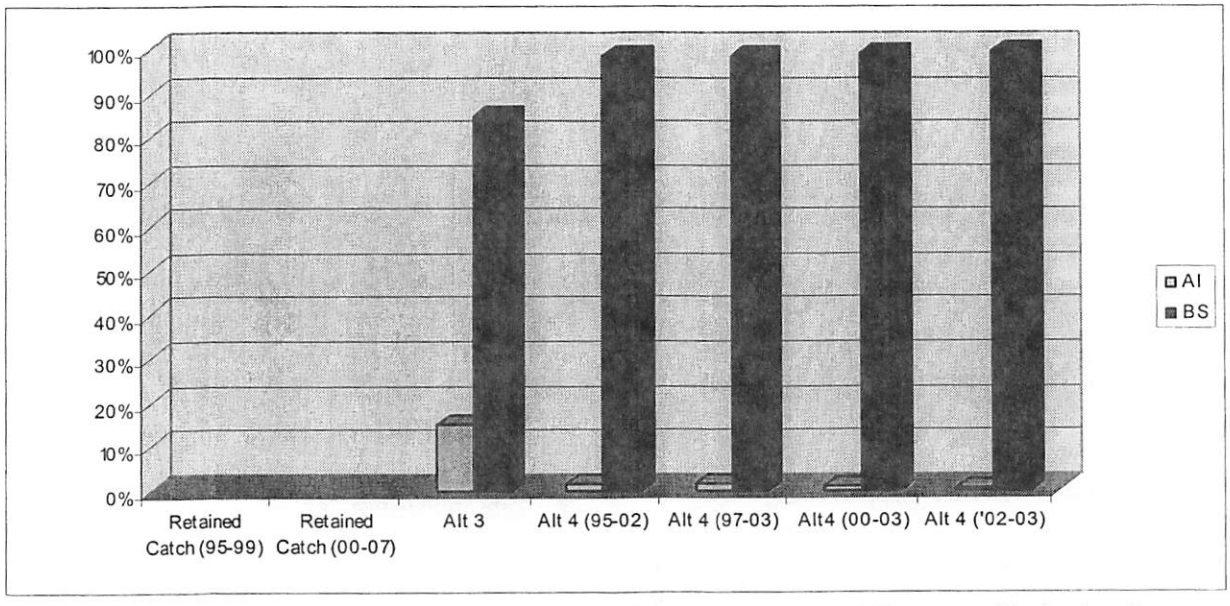


Figure 6 Example of AI and BS Pacific cod allocations for hook-and-line < 60' sector with meal under Alternative 3 and 4. Note retained catch data not shown due to restrictions on confidential data.

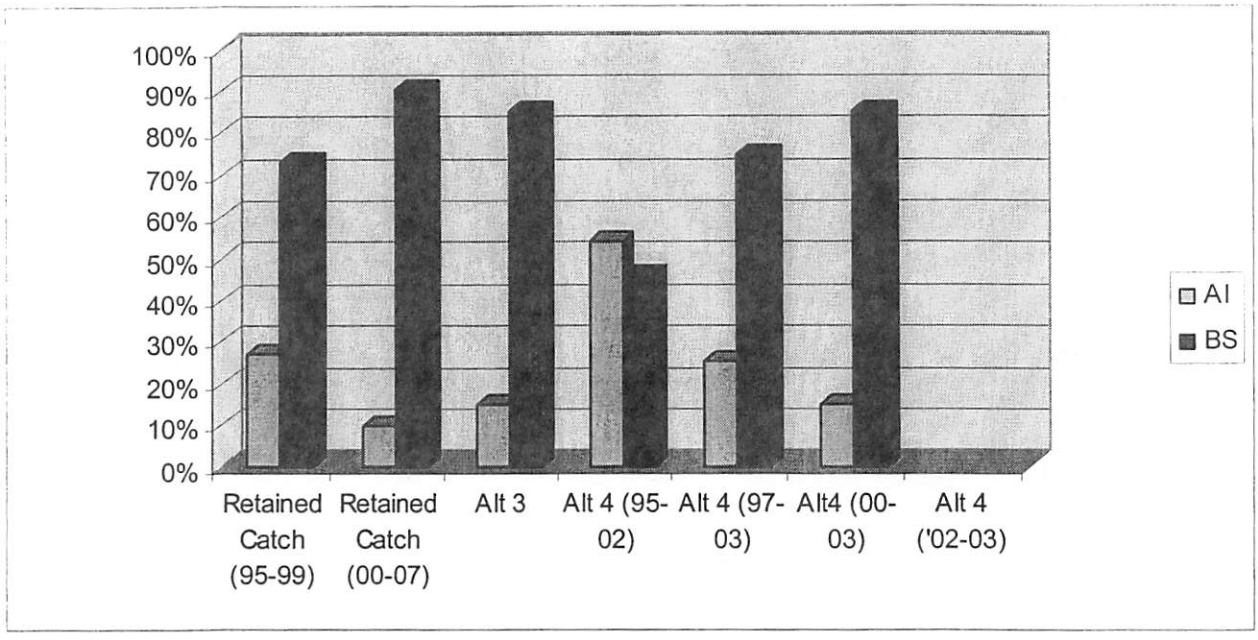


Figure 7 Example of AI and BS Pacific cod allocations for pot CP sector with meal under Alternative 3 and 4. Note Alt 4 (02-03) allocation not shown due to restrictions on confidential data.

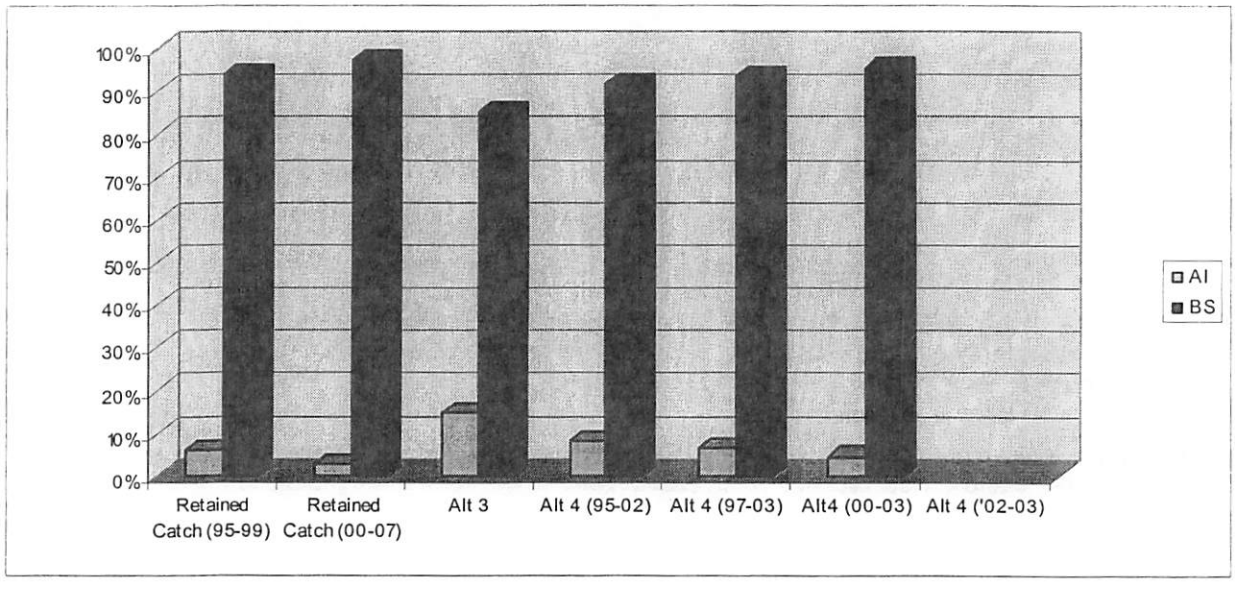
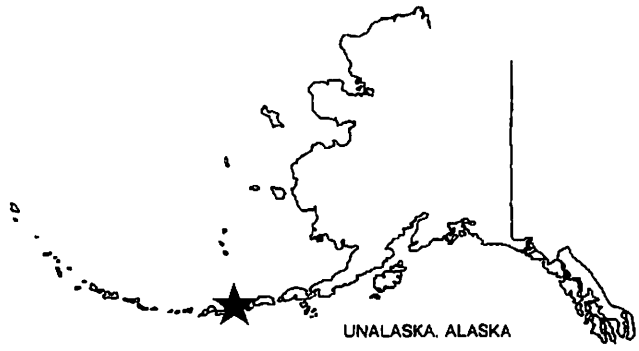


Figure 8 Example of AI and BS Pacific cod allocations for pot CV sector with meal under Alternative 3 and 4. Note Alt 4 (02-03) allocation not shown due to restrictions on confidential data.

AGENDA C-3(d)c
Supplemental
DECEMBER 2008

CITY OF UNALASKA
P.O. BOX 610
UNALASKA, ALASKA 99685-0610
(907) 581-1251 FAX (907) 581-1417



November 30, 2008

Eric A Olson, Chairman
North Pacific Fishery Management Council
605 W 4th Avenue, Suite 306
Anchorage, AK 99501

Subject: C-3 Groundfish Catch Specifications (d) Review Discussion Papers on Pacific Cod Area Spilt between Bering Sea and Aleutian Island

Dear Chairman Olson:

Through this letter, the City of Unalaska would like to express its concern about the proposed Bering Sea and Aleutian Island Cod spilt. We are not questioning the science involved in supporting a spilt; we simply do not see the split as a pressing issue for the Council at this time, especially considering the fact that a pending biological opinion that may come out in late 2009 could impact this issue. We must remember that Council put the time-consuming discussion of this controversial issue on the shelf three years ago; we have to ask if it should now be given priority over other issues.

In its February of 2008 minutes, the SSC listed the following questions that they thought needed to be answered in a comprehensive review of this issue:

- What criteria should be used to indicate when genetic differences are large enough to necessitate management as separate stocks? In other words, since stocks can be defined for management purposes alone, to what extent does genetic knowledge inform management issues?
- Is there a conservation concern for cod in either the EBS or in the AI?
- Is there enough information available for reliable assessments if a spilt is made?
- What implementation issues will arise with respect to various fishery sectors if a spilt is made?
- Would the management system be able to resolve the allocation issues among the various sectors? There was talk at the AP of a committee being formed to work on the implementation issues within the various sectors.
- What research issues remain unresolved regarding stock structure, and are these serious enough to argue against making a spilt?

- What new model structure will be needed to represent the population dynamics of Pacific Cod in the BSAI? Examining some AI cod stock assessment modeling work by UW researchers Kinzey and Punt may be useful.

In its October 2008 minutes on this issue, the SCC stated that there is sufficient justification for a spilt in Pacific Cod between the BS and AI areas. **They also recommended that a precautionary approach should be taken by specifying separate ABCs for this species.** The four alternatives included in the discussion paper are almost three-years-old. They need to be reviewed and updated, and the SSC's questions in the bulleted text above should be answered in a comprehensive review of this issue.

Unalaska's main concern is that if Council moves ahead with a spilt of 13% or more to the Aleutians, this shift will impact all Bering Sea communities and some cod harvesters will have to move part of there annual fishing operations to the Aleutians Islands, which will impact cod landings in Unalaska, and, as a result, impact the local processing plants, the support sector businesses, and the City's fish and sales tax revenues.

Thank you for considering our concerns on this very important issue for the community of Unalaska.

Sincerely

Frank Kelty
Natural Resources Analyst

CC: Mayor Shirley Marquardt,
Unalaska City Council Members,
Chris Hladick, Unalaska City Manager