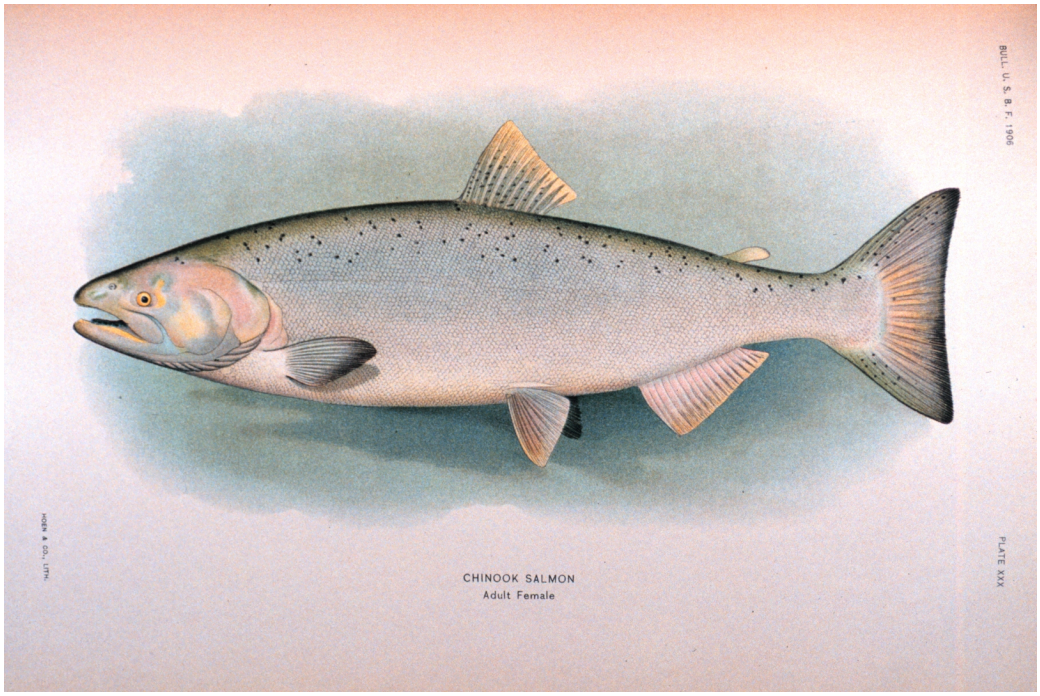
Preliminary Comment Analysis Report
for the
Bering Sea Chinook Salmon Bycatch Management
Environmental Impact Statement/
Regulatory Impact Review/
Initial Regulatory Flexibility Analysis



North Pacific Fishery Management Council

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, Alaska Region

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Introduction

In December 2008, the National Marine Fisheries Service (NMFS), in conjunction with the North Pacific Fishery Management Council (Council), issued the Bering Sea Chinook Salmon Bycatch Management Draft Environmental Impact Statement/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (DEIS). NMFS decided to prepare an EIS under the provisions of 40 CFR 1501.3(b) in order to assist agency planning and decision-making.

The DEIS provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative management measures to minimize Chinook salmon bycatch in the Bering Sea pollock fishery. The final preferred alternative would be Amendment 91 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP). This EIS is intended to serve as the central decision-making document for the North Pacific Fishery Management Council (Council or NPFMC) to recommend Amendment 91 to the Secretary of Commerce. The EIS would also serve as the central decision-making document for the Secretary of Commerce to approve, disapprove, or partially approve Amendment 91, and for the National Marine Fisheries Service (NMFS or NOAA Fisheries) to implement Amendment 91 through federal regulations.

In conformance with the National Environmental Policy Act (NEPA) requirements, NMFS solicited public comment on the DEIS. NMFS accepted public comments on the DEIS during an 80-day public comment period from December 5, 2008, to February 23, 2009. NMFS received 61 letters of comment. The letters of comment are posted on the NMFS Alaska Region web page at: http://www.fakr.noaa.gov/sustainablefisheries/bycatch/salmon/chinook/comments/default.htm

This preliminary Comment Analysis Report (CAR) provides summaries f the public comments received during the comment period and presents the agency's preliminary responses. This CAR provides this information to the decision-makers prior to the publication of the Final EIS. This CAR is also a tool to be used by the EIS authors to revise the EIS and respond to each statement of concern. Changes to the EIS from draft to final as a result of public comment are noted in this report.

The Role of Public Comment

NEPA is a procedural law intended to facilitate better government decisions concerning the management of our lands and oceans. The law has an environmental emphasis. Drafters of the law believed that by requiring a process designed to provide decision-makers with the best information available about a proposed action and its various alternatives, fewer adverse impacts would occur. NEPA does not dictate protection of the environment, but instead assumes that common sense and good judgment, based on a thorough analysis of impacts of various alternatives, will result in the development of the Nation's resources in a way that minimizes adverse impacts to our environment. This is achieved by requiring an open public process whereby the responsible government agency, combined with the stakeholders associated with a particular natural resource and development project, pull together and present relevant information for use in making decisions.

What is the Response to Public Comments?

NEPA requires government agencies to include in a Final EIS all the comments received on the Draft. The Final EIS must include responses to the comments, and must describe any changes made to the DEIS as a result of those comments.

According to the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR §1503.4), an agency preparing a final EIS shall assess and consider comments both individually and collectively and shall respond by one or more of the means listed below, stating its response in the final statement. Possible responses include the following:

1. Modify alternatives including the proposed action.

2. Develop and evaluate alternatives not previously given serious consideration by the agency.

3. Supplement, improve, or modify its analysis.

4. Make factual corrections.

5. Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.

NMFS staff, Council staff, and Alaska Department of Fish and Game staff, as a cooperating agency, have undertaken a careful and deliberate approach to ensure that all substantive public comments are reviewed, considered, and responded to. This preliminary CAR also serves as an intermediate document that will inform NMFS, the Council, and the public of the issues that need to be addressed in the final EIS. A final CAR will become Chapter 16 in the final EIS.

Analysis of Public Comments

The analysis of public comment on the DEIS was a multi-stage process that included reviewing and summarizing the comments within each submission, preparing responses, and reviewing the responses. The process is explained in detail below.

The NMFS Alaska Region staff copied and logged all incoming letters of comment, maintaining a comprehensive list of all public comments. Staff assigned each letter or email a unique submission ID#. The 61 letters of comment are posted in the order in which they were received on the NMFS Alaska Region web page at:
http://www.fakr.noaa.gov/sustainablefisheries/bycatch/salmon/chinook/comments/default.htm

Each letter of comment was reviewed by the preparers. The preparers divided each submission by its individual comments, each of which was assigned a Comment ID#. The goal was to capture each sentence and paragraph in a comment letter containing substantive content pertinent to the DEIS. Substantive content included assertions, suggested alternatives or actions, data, background information or clarifications relating to the DEIS document or its preparation. The substantive comments were summarized and organized by issue area. Within the 61 letters received by NMFS, the preparers identified 304 specific substantive comments. The preparers then wrote the response for each summarized comment.

The comment summaries and preliminary responses are presented in this report by DEIS chapter and then by subject area. During the process of identifying statements of concern, all comments were treated equally. The emphasis is on the content of the comments. They were not weighted by organizational affiliation or other status of commenters. No effort has been made to tabulate the number of people for or against a specific aspect of the DEIS. In the interests of producing a Final EIS that both meets the mission of NMFS and best serves all stakeholders, all comments will be considered equally on their merits.

Quality Control and Review

All comments and responses were reviewed by the preparers and NOAA General Counsel-Alaska Region. Additionally, various procedures were established in the analysis process to prevent a submission or comment from being inadvertently omitted. Communication and cross-checking between the submissions and the comments has ensured that all submissions received during the comment period are included in the report. As a preliminary Comment Analysis Report, this process of quality control and review is ongoing through the development of the Final EIS.

Overview of the Alternatives

Chapter 2 of the DEIS describes and compares four alternatives for minimizing Chinook salmon bycatch, including detailed options and suboptions for each alternative.

Alternative 1: Status Quo (No Action)

Alternative 2: Hard cap

Alternative 3: Triggered closures

Alternative 4: Preliminary Preferred Alternative (PPA)

The alternatives analyzed in the DEIS generally involve limits or "caps" on the number of Chinook salmon that may be caught in the Bering Sea pollock fishery and closure of all or a part of the Bering Sea to pollock fishing once the cap is reached. These closures would occur when a Chinook salmon bycatch cap is reached even if the entire pollock total allowable catch (TAC) has not yet been harvested.

Alternative 1: Status Quo

Alternative 1 would retain the current Chinook Salmon Savings Area (SSA) closures and the exemption for vessels that participate in the Voluntary Rolling Hotspot System Intercooerative Agreement (VRHS ICA). Only vessels directed fishing for pollock are subject to the SSA closures and VRHS ICA regulations. Once the pollock fleet reaches the Chinook salmon prohibited species catch limit of 29,000 Chinook salmon, the SSA areas are closed for the remainder of the season. The Chinook salmon prohibited species catch limit is apportioned to the Community Development Quota (CDQ) and non-CDQ fisheries. The pollock fishery can continue to harvest pollock outside of the closed areas. Pollock vessels participating in the VRHS ICA, under regulations implemented for BSAI FMP Amendment 84, are exempt from these closures.

Alternative 2: Hard Cap

Alternative 2 would establish separate Chinook salmon bycatch caps for the pollock fishery A and B seasons which, when reached, would require all directed pollock fishing to cease for the remainder of that season.

Table 1 contains the Alternative 2 components, and options for each component, to determine (1) the total cap amount and how to divide the total cap between the A and B season, and (2) whether and how to allocate the cap to sectors, (3) whether and how salmon can be transferred among sectors, and (4) whether and how the cap is allocated to and transferred among cooperatives.

Table 1 Alternative 2 components, options, and suboptions.

Setting the hard cap (Component 1)	Option 1: Select from a range of numbers	i) 87,500 ii) 68,392 iii) 57,333 iv) 47,591 v) 43,328 vi) 38,891 vii) 32,482 viii) 29,323			
		Suboption adjust periodically based on updated bycatch information			
	Divide cap between A and B season	Option 1-1: 70/30 (A season/B season) Option 1-2: 58/42 (A season/B season) Option 1-3: 55/45 (A season/B season) Option 1-4: 50/50 (A season/B season)			
		Suboption rollover unused salmon from the A season to the B season, with in a sector and calendar year.			
Allocating the hard cap to sectors (Component 2)		CDQ	Inshore CV	Mothership	Offshore CP
	No allocation	7.5%	92.5%; managed at the combined fishery-level for all three sectors		
	Option 1 (AFA)	10%	45%	9%	36%
	Option 2a (hist. avg. 04-06)	3%	70%	6%	21%
	Option 2b (hist. avg. 02-06)	4%	65%	7%	25%
	Option 2c (hist. avg. 97-06)	4%	62%	9%	25%
	Option 2d (midpoint)	6.5%	57.5%	7.5%	28.5%
Sector transfers (Component 3)	No transfers				
	Option 1	Caps are transferable among sectors within a fishing season			
		Suboption: Maximum amount of transfer limited to:		a	50%
				b	70%
				c	90%
	Option 2	NMFS rolls over unused salmon bycatch to sectors still fishing in a season, based on proportion of pollock remaining to be harvested.			
Allocating the hard cap to cooperatives (Component 4)	No allocation	Allocation managed at the inshore CV sector level.			
	Allocation	Allocate cap to each cooperative based on that cooperative's proportion of pollock allocation.			
	Cooperative Transfers	Option 1	Lease pollock among cooperatives in a season or a year		
		Option 2	Transfer salmon bycatch		
		Suboption Maximum amount of transfer limited to the following percentage of salmon remaining:		a	50%
				b	70%
				c	90%

Alternative 3: Triggered Closures

Alternative 3 would establish time and area closures that are triggered when specified cap levels are reached. The cap levels for triggered closures would be set in the same way as those described under Alternative 2 and may be apportioned to sectors. Also similar to Alternative 2, the caps may be allocated to sectors as transferable allocations. Closures would be of a single area in the A season and three areas in the B season. Once specified areas are closed, pollock fishing could continue outside of the closure areas until either the pollock allocation is reached or the pollock fishery reaches a seasonal (June 10) or annual (November 1) closure date. Table 2 provides the five components and their options included under Alternative 3. The components and options that are the same as Alternative 2 are contained in Table 1.

Table 2 Alternative 3 Components and options.

Setting the cap (Component 1)	Same as Alternative 2, Component 1			
Managing the cap (Component 2)	NMFS closes areas to pollock fishing when cap is reached	No allocation	7.5% to CDQ	92.5%; managed at the combined fishery-level for all three sectors
	Option 1: ICA manage vessels to avoid the cap and close areas when cap is reached			
Allocating the hard cap to sectors (Component 3)	Same as Alternative 2, Component 2			
Sector transfers (Component 4)	Same as Alternative 2, Component 3			
Area Closures (Component 5)	A season closure area (Figure 1)	Once triggered, area would close for the rest of the A season		
	B season closure areas (Figure 2)	If the trigger was reached before August 15, all three areas would close on August 15th for the rest of the B season. If the trigger was reached after August 15th, all three areas would close immediately for the rest of the B season.		

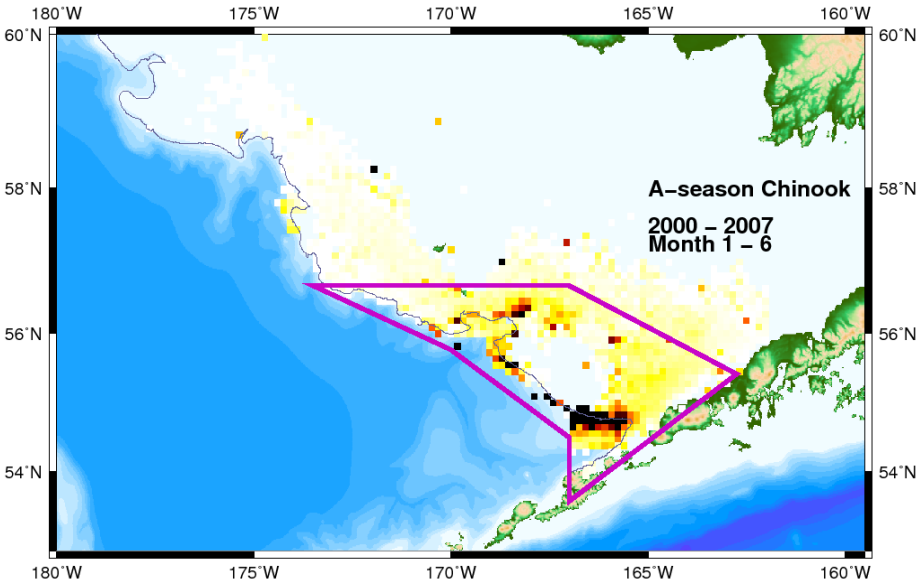

Figure 1 Proposed A-season trigger closure, encompassing 90% of Chinook bycatch in 2000-2007.

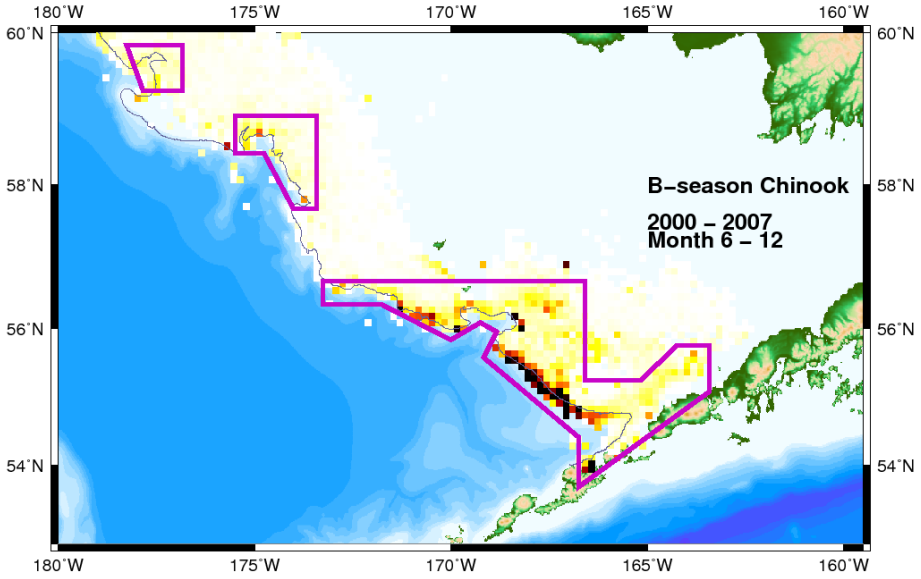

Figure 2 Proposed B-season trigger closures, encompassing 90% of Chinook bycatch in 2000-2007.

Alternative 4: Preliminary Preferred Alternative

Alternative 4 provides for two different annual scenarios with different caps for each scenario (Table 3). Annual Scenario 1 (PPA1) contains a dual cap system with a high cap of 68,392 salmon and a backstop cap of 32,482 salmon. Annual Scenario 2 (PPA2) contains a cap of 47,591. The higher cap would be available if some or all of the pollock fishery participates in a private contractual arrangement called an intercooperative agreement (ICA) that establishes an incentive program to keep Chinook salmon bycatch below the 68,392 Chinook salmon cap. The combination of the higher cap and the bycatch reduction

incentive program in the ICA is intended to provide a more flexible and responsive approach to minimizing salmon bycatch than would be achieved by a cap alone. The PPA would rely on the cap to limit Chinook salmon bycatch in all years and on the ICA to keep bycatch as far as possible below the cap.

At final action, the Council may choose either PPA1, PPA2, or both PPA1 and PPA2. The prescribed sector splits (and provisions to divide the sector splits to the inshore catcher vessel cooperative level and among CDQ entities) are identical for both the PPA1 high cap and PPA2 cap. All caps would be partitioned seasonally 70 percent to the A season (January 20 - June 10) and 30 percent to the B season (June 10-November 1).

Table 3 Alternative 4 components

Setting the hard cap (Component 1)	**PPA1**	High cap 68,392 Chinook salmon for vessels in a NMFS-approved ICA			
		Backstop cap 32,482 Chinook salmon for vessels not in a NMFS-approved ICA.			
	PPA 2	A Cap of 47,591, with no ICA.			
	PPA1 + PPA2	A fleet-wide cap of 47,591, unless industry submits and NMFS approves an ICA agreement which provides explicit incentive for salmon avoidance, then the cap increases to 68,392 Chinook salmon. Vessels not in the ICA would be subject to the backstop cap of 32,482.			
	A season/B season division	PPA1 high cap and PP2 cap would be divided 70/30 between the A and B season			
	Seasonal rollovers	NMFS would rollover up to 80 percent of a sector's or cooperative's unused salmon bycatch from its A season account to that sector's or cooperative's B season account. No rollover would occur from the B season to the A season.			
Allocating the hard cap to sectors (Component 2)		**CDQ**	**Inshore CV**	**Mothership**	**Offshore CP**
	A season	9.3%	49.8%	8.0%	32.9%
	B season	5.5%	69.3%	7.3%	17.9%
Sector transfers (Component 3)	If sector level caps are issued as transferable allocations, then these entities could request NMFS to move a specific amount of the transferable allocation from one entity's account to another entity's account during a fishing season.				
Allocating the hard cap to cooperatives (Component 4)	Each inshore cooperative and the inshore limited fishery would receive a transferable allocation of the inshore CV sector level cap and must stop fishing once the allocation is reached.				
	Inshore cooperative allocations would be based on that cooperative's AFA pollock allocation percentage. Inshore limited allocation would be based on the pollock history of those vessels participating in the limited fishery.				
	Cooperative Transfers	Cooperatives could request NMFS to move a specific amount of the transferable allocation from one cooperative's account to another cooperative's account during a fishing season.			

Response to Comments

Chapter 1 Comments

These comments are on Chapter 1; the purpose and need, Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA) national standards, NEPA issues, and general EIS issues.

NMFS acknowledges the following general comments:

- NMFS has portrayed a very jaded management perspective and it is clear that NMFS is mainly concerned with ensuring that pollock fishing continues even if salmon are not effectively conserved.

- Not enough is being done to reduce the bycatch high rate in the pollock trawl fishery.

- The proposed actions (including "no Action") have the potential to significantly affect the human environment of the Bering Sea.

- It takes too long to implement a management action when there are clear concerns regarding conservation and sustainability of the Chinook salmon stocks.

- Take final action in April 2009 to meet the goal as stated in the DEIS of controlling and reducing salmon bycatch regardless of annual abundance. Despite the deficiencies of the DEIS, any further delay would be detrimental to the salmon resource, meeting escapement objectives, and the communities and people who depend on the salmon resource, both in the US and Canada.

- Immediate action should be taken to reduce wasteful Chinook salmon bycatch in the groundfish fisheries despite the numerous problems with the DEIS. It is taking too long to implement this management action when there are clear concerns regarding conservation and sustainability of the Chinook salmon stocks. The state of Chinook salmon, and the communities who depend on them for subsistence and income, has deteriorated rapidly since the Council first began this action.

- Flexibility in the strategy to minimize salmon bycatch is important to minimize effects of the pollock fishery, but should not preclude decisive action to protect salmon stocks and the communities, commercial fisheries, and subsistence fisheries that depend on them.

Comments on legal issues

Comment 1-1: How are the alternatives consistent with the Magnuson-Stevens Act requirement to reduce salmon bycatch?

Response: The alternatives represent a range of bycatch management measures for analysis that assist the decision-makers and the public in determining the best alternative to meet the purpose and need for the action. The DEIS explains the purpose and need in section 1.2. The alternatives meet the purpose and need by presenting different ways to minimize Chinook salmon bycatch in the Bering Sea pollock fishery

to the extent practicable while achieving optimum yield. Based on this DEIS analysis and the public comments received, the Council will be able to make an informed decision on which alternative best meets the purpose and need for the action. In selecting its recommended preferred alternative, the Council must comply with the Magnuson-Stevens Act and all other applicable federal laws. With respect to the Magnuson-Stevens Act, the Council's preferred alternative must be consistent with all ten national standards. The most relevant for this action are National Standard 9, which requires that conservation and management measures shall, to the extent practicable, minimize bycatch; and National Standard 1, which requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The Magnuson-Stevens Act defines optimum yield as the amount of harvest which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems. The Final EIS and the record of decision will explain how the final preferred alternative best meets the purpose and need and complies with the Magnuson-Stevens Act.

Comment 1-2: The Chinook salmon bycatch plan was developed to meet the objectives of National Standard 9. However, what is required by National Standard 9 has been hotly debated before the courts with various parties offering different interpretations. According to the DEIS, the interpretation of National Standard 9 used to justify the proposed bycatch reduction proposal is that National Standard 9 "expressly requires that bycatch be avoided to the maximum extent practicable" and that "every" practicable effort be made to avoid bycatch, DEIS at 688-689. This interpretation of National Standard 9 has been expressly rejected by the courts as unnecessarily and unlawfully strict. Contrary to the DEIS, National Standard 9 does not "expressly" require that bycatch be avoided to the "maximum" extent practicable. Alternatives 2-4 were designed to meet a non-existent legal standard. National Standard 9 does not require that these bycatch reduction measures be adopted.

Response: This comment mischaracterizes the DEIS. In no less than ten places, the DEIS correctly notes that National Standard 9 requires that the adopted bycatch management measures, among other things, minimize bycatch to the extent practicable. Most prominently, the Purpose and Need section of the DEIS clearly states: "The purpose of Chinook salmon bycatch management in the Bering Sea pollock fishery is to minimize Chinook salmon bycatch to the extent practicable, while achieving optimum yield from the pollock fishery." DEIS at 2.

As the comment notes, on pages 688-89 in the Regulatory Impact Review (RIR) (Chapter 10 of the DEIS) is a quotation from the October 2008 minutes of the Scientific and Statistical Committee (SSC) contains the SSC's discussion of the difference between an incidental catch allowance and a prohibited species catch limit, the latter of which "must be regarded as a 'prohibition' against harvest (to the maximum extent practicable), with an absolute cap" (DEIS at 688). The RIR goes on to explain that "this is so critical a distinction that it has been enshrined as National Standard 9 of the Magnuson-Stevens Act, expressly require[ing] that bycatch be avoided to the maximum extent practicable." NMFS agrees that it would have been preferable to use the exact language of National Standard 9 here. Accordingly, NMFS has corrected the non-quoted portion of the text on page 689. However, in light of the DEIS's correct statements in the other, more relevant passages and the context of the SSC's discussion here, the DEIS did not rely on the standard set forth on pages 688-89 in any material way, including with respect to the development, discussion, and analysis of Alternatives 2-4.

Comment 1-3: Alternatives 2-4 each violate National Standard 1 of the MSA by preventing the achievement of optimum yield in the pollock fishery. First, as the DEIS readily admits through its calculations of forgone catch and revenue, the bycatch reduction measures will prevent the harvest of the

pollock TAC. Achieving the optimum yield for the BSAI groundfish fishery depends on fully harvesting the pollock TAC. Additionally, Alternatives 2-4 will prevent the achievement of the optimum yield the fishery is capable of producing on a continuing basis by forcing the harvest of less biologically acceptable age and size classes, all in violation of National Standard 1. Finally, preventing the full harvest of the pollock TAC because of bycatch-induced fishery closures will deprive the U.S. of substantial quantities of protein. Given that food production is a key element of achieving optimum yield, restrictions on food production caused by Alternatives 2-4 violate National Standard 1.

Response: NMFS disagrees. This comment conflates achieving optimum yield with harvesting the total allowable catch. The MSA defines optimum yield to mean "the amount of fish which . . . (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; [and] (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor . . . ." 16 U.S.C. § 1802(33). NMFS has established that the optimum yield for the Bering Sea Aleutian Island Management area is a range from 1.4 to 2.0 million metric tons (mt). 50 C.F.R. § 679.20(a)(1)(i).

By contrast, the total allowable catch "is the annual harvest limit for a stock or stock complex, derived from the [acceptable biological catch] ABC by considering social and economic factors" (Fishery Management Plan for Groundfish of the BSAI Management Area ("BSAI FMP") (Jan. 2009) at 13). NMFS's regulations provide that the "sum of the TACs so specified must be within the [optimum yield] range . . . ." 50 C.F.R. § 679.20(a)(2). The BSAI FMP provides further elaboration of the differences among optimum yield (OY), acceptable biological catch (ABC) and total allowable catch (TAC):

> In addition to definitional differences, OY differs from ABC and TAC in two practical respects. First, ABC and TAC are specified for each stock or stock complex within the "target species" and "other species" categories, whereas OY is specified for the groundfish fishery (comprising target species and other species categories) as a whole. Second, ABCs and TACs are specified annually whereas the OY range is constant. The sum of the stock-specific ABCs may fall within or outside of the OY range. If the sum of annual TACs falls outside the OY range, TACs must be adjusted or the FMP amended (BSAI FMP at 13).

Thus, whether salmon bycatch management measures preclude the pollock fishery from harvesting its entire TAC for any given year is not determinative of whether the BSAI groundfish fishery achieves optimum yield. If the total catch for the BSAI groundfish fishery is within 1.4 and 2.0 million mt over the long-term, optimum yield will have been met. NMFS will clarify the use of the term optimum yield in the Final EIS to reflect this response and the statute, NMFS's regulations, and the BSAI FMP, which are authoritative and explicit on this issue.

It is worth emphasizing that "optimum yield is a standard that should be achieved over the long-run, not necessarily a standard that must be achieved with precision each year." Nat'l Coalition For Marine Conservation v. Evans, 231 F.Supp.2d 119, 135 (D. D.C. 2002). See also 50 C.F.R. § 600.310(f)(1)(ii) ("'achieving, on a continuing basis, the OY from each fishery' means producing, from each fishery, a longterm series of catches such that the average catch is equal to the average OY and such that status determination criteria are met"). In this case, even if the Council and NMFS were to evaluate compliance with National Standard 1 only in terms of the amount of groundfish harvested in the BSAI Management Area, each alternative would achieve optimum yield (1.4 – 2.0 million mt), though to varying degrees. For example, if one considers the lowest hard cap option (29,300), the table below shows that, under the

worst case scenarios, after subtracting the forgone pollock from the total catch within the BSAI groundfish fishery, optimum yield still would have been met for the 2003-2007 period.

Year	Alternative	Cap	Total forgone pollock (mt)	BSAI groundfish total catch	Difference
2003	2a (50/50)	29,300	392,440	1,973,541	1,581,101
2004	2a (50/50)	29,300	286,802	1,979,143	1,692,341
2005	2a (50/50)	29,300	401,470	1,981,374	1,579,904
2006	2d (50/50)	29,300	503,048	1,976,553	1,473,505
2007	2a (70/30)	29,300	653,339	1,856,717	1,203,378

See DEIS at 170-74 (Tables 4-4 through 4-8). Theoretically, while the total catch in 2007 would have been below 1.4 million mt, the results of that single year do not undermine the conclusion that OY would have been met even under the worst case scenario because, as noted above, OY is measured over the long-term.

With respect to the argument that the alternatives would force the harvest of less biologically acceptable age and size classes, the DEIS notes this possibility if pollock fishermen go to extremes to avoid salmon bycatch, DEIS at 165. The DEIS explains that this could result in lower TACs and ABCs. However, as explained above, a lower TAC for the pollock fishery does not necessarily correlate to a failure to achieve OY. Moreover, if the BSAI groundfish fishery fails in the future to achieve optimum yield on a continuing basis, the Council and NMFS will assess the reasons for that failure and either propose modifications to the FMP or reassess the determination that OY for the fishery is between 1.4 and 2.0 million mt (or both).

With respect to the argument that the alternatives violate National Standard 1 because they would deprive the United States citizens of substantial quantities of protein, the commenter misconstrues National Standard 1. Overall benefit to the Nation does not equate with protein supply. Rather, it requires consideration, in addition to food production, of recreational opportunities and protection of marine ecosystems. Further, commenter's argument is speculative. It makes several assumptions not supported by the best scientific information available, such as that no protein substitution would occur and that all of the forgone pollock would have been delivered to U.S. markets (as opposed to exported). Nonetheless, NMFS will consider any credible information to the contrary that becomes available.

Comment 1-4: When considering the requirements of National Standard 1 and the practical meaning of the term "to the extent practicable" in National Standard 9, it is important to bear in mind the complete statutory context. The ultimate goal of the MSA is to conserve and manage fisheries to achieve their optimum yield. Reducing bycatch is not the MSA's top priority. To achieve optimum yield, the goals of the different National Standards may conflict, and the goals of one will take priority over the goals of another. In this case, to strike an overall balance, not all National Standards are created equally and National Standard 1 provides a mandate that optimum yield be achieved.

Response: To the extent this commenter argues Congress intended NMFS to give National Standard 1 priority over National Standard 9, or any other standard, NMFS disagrees. All regulations enacted under the MSA must be consistent with the ten national standards. 16 U.S.C. § 1851(a). Congress did not establish any priority among the specific standards. It did, however, establish that the "purpose of the Act is clearly to give conservation of fisheries priority over short-term economic interests." Natural Res. Def.

Council v. NMFS, 421 F.3d 872, 879 (9th Cir. 2005); see also, Natural Res. Def. Council v. Daley, 209 F.3d 747, 753 (D.C. Cir. 2000). The Council and NMFS will therefore ensure that the final action is consistent with the national standards in light of the MSA's over-arching purpose.

To the extent this commenter argues Congress intended NMFS to consider and balance all the national standards in the development of regulations, NMFS agrees. Congress was aware of the potential conflicts among the competing National Standards' requirements and authorized the Secretary of Commerce to exercise discretion and judgment in balancing the standards. Alliance Against IFQs v. Brown, 84 F.3d 343, 350 (9th Cir. 1996).

Comment 1-5: The DEIS neglects to specifically address National Standard 8, which requires minimizing adverse economic impacts on communities. Although the DEIS discusses communities in several sections, the DEIS fails to explicitly address the requirement in relation to the other National Standards. The DEIS does not provide enough or detailed enough analysis as to how the proposed action and its various alternatives may affect coastal Alaska Native communities. Miscalculations, omissions, and inaccuracies abound in the analysis on subsistence users and their harvest. The DEIS in no way satisfies the intent of National Standard 8 regarding the impact to fishing communities. Thus, NOAA Fisheries should consider National Standard 8, as balanced with the other National Standards, especially in the context of adverse impacts on the subsistence and commercial economics in Western Alaska salmon fisheries.

Response: NMFS agrees that the Council and NMFS must consider and weigh all National Standards, including National Standard 8, when they select and approve the final action. National Standard 8 provides:

> Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data [based on the best scientific information available,] in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

16 U.S.C. § 1851(a)(8). NOAA guidance on National Standard 8 explains that this standard requires that a fishery management plan take into account the importance of fishery resources to fishing communities, and where the preferred alternative negatively affects the sustained participation of fishing communities, the FMP should discuss the rationale for selecting this over another alternative with a lesser impact on fishing communities. 50 C.F.R. § 600.345(b)(1).

The DEIS itself does not attempt to balance the National Standards. The Council and NMFS will perform that analysis when they select and approve the final action. The DEIS endeavors to analyze all impacts from the alternatives in order to disclose such information to the public and provide the decision-makers with the necessary information to balance the National Standards and render a final decision. Chapter 9, Section 9.4.2 describes subsistence harvests of Chinook salmon, and Chapter 10, Section 10.3 provides detailed descriptions of regional subsistence salmon fisheries throughout western Alaska.

NMFS agrees that the EIS should provide a more complete description of subsistence users, their Chinook harvest, and the value of this fishery to western Alaska, even if the total value of the Chinook subsistence harvest cannot be evaluated in a way that is directly comparable to the monetary value of potential increases in commercial Chinook salmon catch or forgone gross revenues from the pollock fleet

(a discussion of this issue is provided in Chapter 10, Section 10.5.1). NMFS will reorganize, clarify and create a section in Chapter 10 of the Final EIS to better address these issues, and add a list and description of information on potentially affected communities.

With regard to the comment that the DEIS does not provide enough analysis as to how the proposed action may affect coastal Alaska Native communities, NMFS lacks the necessary information to provide community-level impact analysis because there is no information available on which NMFS could rely to directly link Chinook salmon taken as bycatch in the pollock fishery with the in-river runs of Chinook salmon near any particular community. The DEIS utilizes the best scientific information available, which is provided and presented by region (Section 10.3). This section provides extensive background information on the subsistence (and commercial and recreational) Chinook salmon fisheries in western Alaska river systems that are likely affected by Chinook salmon bycatch. The regions are based on the ADF&G management areas (Kotzebue, Norton Sound, Kuskokwim River/Bay, Yukon, and Bristol Bay).

In addition, Chapter 10, Section 10.5.1.3 (p. 631) of the DEIS states that it is not possible with presently available information to determine the proportions of river-specific Adult Equivalency (AEQ) estimates of returning adult Chinook salmon that would be caught in subsistence fisheries (or commercial or recreational fisheries) in the various river systems of western Alaska, and further, in any particular community. This section notes that, while it is difficult to assess the specific impacts of additional AEQ Chinook salmon to a given river system, it is reasonable to assume that any additional fish would benefit escapement and harvest.

Finally, shoreside processing sector revenue impacts are estimated in the RIR (Chapter 10), embedded within the overall shoreside sector impacts. This is because the price used to estimate impacts on the shoreside sector is inclusive of all value-added processing, at shoreside plants, to the first wholesale level. It is important to note that the analysis includes shoreside processing impacts, just not at the port or community level. Confidentiality requirements prevent refining shoreside impacts down to the port or community level.

Comment 1-6: NMFS's government-to-government consultations efforts have been less than impressive, and NMFS have been resistant to developing formal and accountable consultation processes and protocols. While the Council has made an admirable effort to reach out with tribes and communities, NMFS continues to conduct inadequate systematic consultation with the Alaska Native tribes as required by the Executive Order (EO) 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and accompanying Presidential memorandum (1994), or EO 13175, Consultation and Coordination With Indian Tribal Governments (2000). NMFS should develop a Tribal Government-to-Government Consultation Plan to outline a framework for working effectively with tribal governments in setting the management direction for Chinook salmon bycatch management. A Tribal Government-to-Government Consultation Plan would be useful in determining the best timing for conducting the consultation meetings which will not conflict with Alaska Native subsistence seasons. This plan should be developed in collaboration with interested tribal governments.

Response: NMFS has a consultation process that involves the tribes early in and throughout the decision-making process in accordance to Executive Order 13175. Presently, for major federal actions that require an EIS, we begin the tribal consultation process at scoping, which is the first step in the decision-making process. Scoping is intended to identify the issues associated with, and alternatives to, the proposed action. The NMFS Regional Administrator sends each tribe a letter explaining the proposed action and how an interested tribe can provide comments and contact NMFS for a consultation. Thereafter, NMFS consults with any tribe upon request. Subsequently, upon release of the DEIS, NMFS

sends another letter to each tribe soliciting comments on the scope and content of the document, providing information on how to receive a copy, and again inviting interested tribes to contact NMFS for a consultation. Likewise, NMFS sends a similar letter with the release of the final EIS. Each tribal consultation letter identifies the NMFS point of contact for the proposed action. That person is typically NMFS's most knowledgeable person on the issues relevant to the proposed action. The NMFS point of contact works with each interested tribe to conduct the consultation.

We are currently discussing ways to make our consultation process more clear to tribal governments, Alaska Native Claims Settlement Act corporations, and interested organizations. We welcome any suggestions interested tribal governments may have.

The response to comment 1-7 details the tribal consultation process for the Chinook salmon bycatch issue, which is being conducted in addition to the extensive Alaska community outreach efforts by the Council. The Final EIS will contain a description of both the NMFS consultation process and the Council outreach program. The EIS provides an environmental justice analysis pursuant to EO 12898.

Comment 1-7: The Final EIS should disclose the tribal consultation and coordination process by providing a chronology with the dates and locations of meetings with tribal governments, results of the meetings, and a discussion of how the tribal government's input was used to develop the EIS and the action alternatives. The tribal consultation process is an opportunity to gather traditional ecological knowledge about local subsistence use and harvest of Chinook and chum salmon in Norton Sound, Kotzebue, Yukon and Kuskokwim Rivers, Bristol Bay, and Gulf of Alaska.

Response: NMFS agrees that the tribal consultation process is an opportunity to learn about local subsistence use and harvest of salmon as well as the cultural value and importance of subsistence. Section 1.5.2 of the DEIS describes the tribal consultation process up to the point of printing of the document. The Final EIS will contain the complete consultation history for this action.

To start the consultation process, NMFS mailed letters to Alaska tribal governments, Alaska Native corporations, and related organizations on December 28, 2007, when NMFS started the EIS scoping process. The letter provided information about the proposed action and the EIS process and solicited consultation and coordination with Alaska Native representatives. NMFS received 12 letters providing scoping comments from tribal government and Alaska Native corporation representatives, which were summarized and included in the scoping report (available on the NMFS Alaska Region web page at: http://www.fakr.noaa.gov/sustainablefisheries/bycatch/salmon/scopingreport.pdf). Additionally, a number of tribal representatives and tribal organizations provided written public comments and oral public testimony to the Council during the Council meetings where the Council developed the alternatives.

Once the DEIS was released, NMFS sent another letter to Alaska Native representatives to announce the release of the document and solicit comments concerning the scope and content of the DEIS. The letter included a copy of the executive summary and provided information on to obtain a printed or electronic copy of the DEIS. NMFS received 14 letters providing comments on the DEIS and the alternatives from tribal government, tribal organization, and Alaska Native corporation representatives, which are summarized and responded to in this Comment Analysis Report. The comment letters are posted on the NMFS Alaska Region web page at: http://www.fakr.noaa.gov/sustainablefisheries/bycatch/default.htm. These comments provide information about local subsistence use of salmon and the importance of Chinook salmon to individuals and communities in Alaska.

Additionally, NMFS received five letters from tribal government representatives requesting a consultation; the Nome Eskimo Community, Chinik Eskimo Community (Golovin), the Stebbins Community Association, the Native Village of Unalakleet, and the Native Village of Kwigillingok. NMFS held a tribal consultation in Nome in January 2009 in conjunction with a Council outreach meeting on Chinook salmon bycatch. Consulting in person with NMFS in Nome were representatives of the Nome Eskimo Community, the Chinik Eskimo Community, and the Native Village of Elim. Consulting by telephone were representatives of the Stebbins Community Association and the Native Village of Unalakleet. Council staff provided information on the DEIS, the alternatives, and the schedule for Council action. NMFS staff provided additional information and then listened to the concerns and issues raised by the tribal representatives. The issues and concerns discussed at the consultation are reflected in the letter from the Nome Eskimo Community, which is summarized and responded to in this report. NMFS also held a tribal consultation teleconference on March 17, 2009, with the Native Village of Kwigillingok and the Bering Sea Elders Advisory Group. The issues and concerns discussed at the consultation are reflected in the letter from the Bering Sea Elders Advisory Group, which is summarized and responded to in this report.

Comment 1-8: The DEIS, on page 18, notes that Title VIII of the Alaska National Interest Lands Conservation Act ("ANILCA") creates a priority for subsistence uses of fish and wildlife over other purposes on public lands. The DEIS cites this priority as a legal rationale for restricting the offshore harvest of pollock. The DEIS contains numerous statements regarding the need to implement this subsistence priority. However, the legal argument advanced in the DEIS for doing so is without merit. The United States Supreme Court has ruled that ANILCA does not apply to the outer continental shelf ("OCS") of the United States. Amoco Production Co. v. Village of Gambell, 480 U.S. 531, 546-47 (1987). The action area for the proposed Chinook salmon bycatch management plan is the OCS region. ANILCA is not legally applicable, a fact the DEIS admits. Nevertheless, the DEIS asserts that NMFS intends to implement ANILCA by using NEPA and the MSA.

There are two legal defects with NMFS's approach. First, if ANILCA does not apply in the OCS region, it is not another applicable law under the MSA. Thus, the MSA does not provide a legal basis to implement ANILCA. Second, NEPA does not provide the authority to enforce the substantive provisions of any statute, including ANILCA. The Supreme Court has ruled on at least four occasions that NEPA is a procedural statute only that requires issues be examined. It does not provide the authority for a particular result to be reached or enforced. Contrary to the legal position set forth in the DEIS, neither the MSA nor NEPA can be used to enforce ANILCA.

Response: This comment mischaracterizes the DEIS and the proposed action. The DEIS clearly states: "ANILCA does not apply to the outer continental shelf (OCS) region", DEIS at 18. It further explains that "NMFS and the Council remain committed to ensuring that federal fishery management actions consider the importance of subsistence uses of salmon and protecting such uses from any adverse consequences." Id. This hardly shows that "NMFS intends to implement ANILCA by using NEPA and the MSA." Rather, it reflects NMFS's and the Council's recognition of the importance of subsistence in Alaska and interest in avoiding actions that have adverse consequences on such uses.

The purpose the proposed action "is to minimize Chinook salmon bycatch to the extent practicable, while achieving optimum yield from the pollock fishery", DEIS at 2. The DEIS analyzes the impacts of alternatives to this proposed action, including potential benefits to subsistence users of salmon. That is part of the NEPA process and understanding the priority that federal and state law have afforded those uses is relevant to understanding the benefits, even if those laws do not dictate the outcome here.

Comment 1-9: According to the DEIS, the pollock bycatch reduction program was designed to meet the requirements of the Pacific Salmon Treaty. The DEIS states the proposed action is an element of the Council's efforts to "ensure" compliance with the Treaty, DEIS at 19. The Problem Statement adopted by the Council states that salmon bycatch "must" be reduced in order to meet the U.S. "obligation" under the Treaty and its associated Yukon River Annex, DEIS at 1. The supposition is incorrect that additional actions to address bycatch are required by the Treaty. The Treaty does not apply to the pollock fishery because it defines a "fishery" as "the activity of harvesting or seeking to harvest salmon." Even if the Treaty applied to the pollock fishery, it would be satisfied by the status quo because salmon bycatch reduction measures have been continued and additional bycatch reduction actions have been taken since 2002. Additionally, the Secretary of State has not made a determination that the US is in jeopardy of not fulfilling its international obligations under the Treaty.

Response: This comment offers interpretations of the Pacific Salmon Treaty with which NMFS disagrees. The purpose of the proposed action is to minimize bycatch to the extent practicable while maintaining optimum yield. The fact that such action also has the potential to contribute to satisfying U.S. treaty obligation is an additional compelling factor in the Council's deliberations. When the United States enters into a treaty with another country it does so in good faith to implement its provisions through relevant domestic law and regulatory action.

The Treaty's provision (Annex IV, Ch. 8, Cl. 12) that the parties must "maintain efforts to increase the in-river run of Yukon River origin salmon by reducing marine catches and by-catches of Yukon River salmon" is not limited to the salmon fishery. Similarly, there is no limitation on "maintain efforts" to only those that were in effect in 2002. Finally, while it is true that the Secretary of State, who is charged with ensuring and determining the United States' compliance with the Treaty, (e.g., 16 U.S.C. §§ 3632(h)(8)), has not issued a formal decision that United States is out of compliance with the treaty, the treaty remains in effect for the United States. This has bearing on the proposed action. In addition, the Council and Secretary of Commerce are not limited to taking action only upon a formal finding of noncompliance with the treaty since the MSA provides independent authority for this action.

Comment 1-10: The DEIS does not adequately analyze the United States' obligations under the Yukon River Salmon Agreement of the Pacific Salmon Treaty. While the treaty is mentioned and described in Section 1.7.13, nowhere does the DEIS discuss the specific obligations and the degree to which the proposed alternatives meet those obligations.

Under the terms of this Treaty the United States is bound to pass a set number of Chinook and fall chum salmon across the Canadian border to provide for Canadian harvests and escapement needs. NMFS must analyze the impacts each alternative will have on compliance with the United States' obligations under the Yukon River Salmon Agreement and identify other actions that may be necessary to ensure compliance with the agreement. Any cap numbers which exceed pre-2002 bycatch numbers may violate the United States' treaty obligations in the Yukon River Salmon Agreement. In-river commercial fisheries are eliminated and subsistence fisheries are regularly reduced to meet our treaty obligations; therefore, NMFS must restrict the take of these same salmon in the pollock fishery.

Response: The Council and NMFS are concerned about the low salmon runs returning to western Alaska which includes those returning to the Yukon River and believe that salmon bycatch should be minimized for several reasons, including, as the Council's problem statement indicates, to address concerns for those living in rural areas who depend on local fisheries for their sustenance and livelihood and to contribute towards efforts to reduce bycatch of Yukon River salmon. It is, however, beyond the scope of this EIS to analyze what level salmon bycatch by the pollock fishery is necessary, in conjunction with the varying

efforts of the State of Alaska, Canada, and other federal agencies, to meet the United States' obligations under the Pacific Salmon Treaty. The specific purpose and need for this action are "to minimize Chinook salmon bycatch to the extent practicable, while achieving optimum yield from the pollock fishery," Draft EIS at 2. Accordingly, the EIS examines alternatives that accomplish this goal. See Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc., 435 U.S. 519, 551 (1978) (the statement of purpose and need of the project determines the range of alternatives that an agency must consider).

Comment 1-11: The parties to the United States-Canada Yukon River Salmon Agreement of 2002 are required to increase the in-river run of Yukon River origin salmon by reducing marine catches and bycatches of Yukon River salmon. They shall further identify, quantify and undertake efforts to reduce these catches and bycatches. How do the alternatives impact the U.S.'s ability to reduce bycatch below pre-2002 levels?

Response: The purposes underlying the proposed action are multi-faceted: minimize Chinook salmon bycatch to the extent practicable, while achieving optimum yield from the pollock fishery. Minimizing Chinook salmon bycatch while achieving optimum yield is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of Chinook salmon, provide maximum benefit to fishermen and communities that depend on Chinook salmon and pollock resources, and comply with the Magnuson-Stevens Act and other applicable federal law. Draft EIS at 2. Accordingly, using the best scientific information available, the DEIS discusses, among other things, the substantive issues involving the portion of salmon taken as bycatch in the Bering Sea that originated from the Yukon River. See response to comment 3-9.

The Council and NMFS remain concerned about the low salmon runs returning to western Alaska which includes those returning to the Yukon River. The Council's problem statement expressly states that salmon "bycatch must be reduced to address the Council's concerns for those living in rural areas who depend on local fisheries for their sustenance and livelihood and to contribute towards efforts to reduce bycatch of Yukon River salmon . . . ."

Comments that the DEIS is inadequate

Comment 1-12: Extend the public comment period for 45 more days to provide more time for the pollock industry to prepare analysis, data, and information for comments on the costs, benefits, and environmental impacts of the proposed action and its alternatives analyzed in the DEIS.

Response: NMFS agreed that the public should be provided more time to read and make informed comments on the document and, on January 9, 2009, a notice was published in the Federal Register to extended the 60-day comment period an additional 20 days, from February 3, 2009, to February 23, 2009 (74 FR 898).

Comment 1-13: Inadequate time was allowed for the public to comment on the 762-page DEIS. An extension of the public comment period was requested to assist in developing the analyses required by NEPA. The twenty-day extension was inadequate to prepare a proper review of the document. The overall length of the comment period remains inadequate to prepare analyses on every issue that must be thoroughly examined before the DEIS can be considered compliant with NEPA.

Response: NMFS provided an 80-day public comment period, including the 20-day extension. This was the optimum length of time to allow both meaningful public comment as well as timely Council action on this important issue.

Comment 1-14: The presentation of the information in the DEIS makes it challenging for the public to understand all the associated impacts and how each alternative differs. The result of this may limit or bias those who can meaningfully participate in agency planning. The FEIS therefore should be organized and written in a clear manner that allows for meaningful public participation, especially for those whose first language is not English.

Response: Though the subjects are complex and the issues numerous, NMFS disagrees that the presentation of the information makes it challenging for the public to understand. The document's organization follows a logical and predictable pattern. Likewise, we have tried to communicate the complex issues as simply as possible to enable the general public to understand the analysis. While the document is unavoidably lengthy, we have tried to err on the side of inclusiveness, rather than run the risk of omitting any information or analysis that might aid decision-makers and the public in evaluating the relative merits of the alternatives. Yet, however lengthy, detailed, and technical the analyses, we have tried our best where possible to keep the information accessible to the reader. As with every large document analyzing extremely complex issues, improvements in clarity and organization can be made. NMFS will continue to work to make the Final EIS more accessible to all readers.

Comment 1-15: DEIS fails to meet the requirements of NEPA insofar as it fails to include an adequate range of alternatives for considered action. The range of alternatives presented fails to explore, in a serious manner, reasonable alternatives to address the obligation to reduce bycatch.

Response: NMFS disagrees. CEQ regulations at 40 CFR 1502.14(a) require that all reasonable alternatives be "rigorously explored and objectively evaluated." It is well settled that the benchmark for determining whether an alternative is reasonable depends on the nature and scope of the proposed action and that the range of alternatives considered in an EIS need not extend beyond those reasonably related to the purpose of the project. The purpose and need of the proposed action is to minimize bycatch to the extent practicable while achieving optimum yield. The range of alternatives in the DEIS includes the status quo or no action alternative, measures to impose hard caps on the taking as bycatch of Chinook salmon, and triggered closure areas. In connection with each of these alternatives, the DEIS also analyzes suites of options, including the distribution of the bycatch cap. This range of alternatives, including the suite of options within each alternative, is reasonable and adequate.

Comment 1-16: Reject this particular DEIS in favor of a more comprehensive and adequate analysis of bycatch. The DEIS does not adequately analyze the options, which impose unrealistic or impracticable restrictions on the Bering Sea pollock fishery. The DEIS is therefore inadequate to support informed decision-making to reduce Chinook salmon bycatch while allowing for reasonable prosecution of the pollock fishery.

For the Council and NMFS to make informed decisions about how to balance all of these important interests, they must have an environmental analysis that fully and accurately examines all of the issues. As the Supreme Court has said, the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4331, requires that there be a “hard look” at all of the issues (Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402 [1971]). This DEIS does not take a hard look at all the issues. It fails to mention basic and critical issues; it fails to include necessary facts and analyses; it analyzes only a small number of issues,

and those issues are analyzed inaccurately or incompletely; and it uses old data that severely underestimates impacts.

On economic issues, the DEIS fails to rigorously evaluate the costs and benefits associated with the alternative measures under consideration; it relies on erroneous assumptions about ownership and investment patterns in the Bering Sea pollock fishery; it fails to consider the full range of impacts that some of the proposed measures would have on economically disadvantaged communities in Western Alaska; it fails to consider other critical factors affecting Chinook salmon runs in Western Alaska; and it fails to correctly depict the bycatch profile of the pollock fleet; and other reasons.

This DEIS does not provide adequate biological and economic information to make a reasonable assessment of management alternatives and therefore cannot be considered a legally sufficient document or adequate to inform decision makers of the consequences of a decision until it identifies and examines those consequences. This DEIS needs a great deal of additional work before being finalized.

Response: NMFS disagrees. The DEIS takes a hard look and provides the analysis necessary for informed decision-making. The DEIS provides the decision-makers and the public with an evaluation of the potential impacts of the alternatives on the human environment based on the best available information. A number of public comments point out specific areas where changes should be made to the document with which NMFS agrees. As a result of this public comment process, NMFS has provided additional information to the Council and the public in this Comment Analysis Report and will incorporate this information and analysis in the Final EIS. Based on the DEIS, this comment analysis report, and the public comments, the Council will have before it all of the information and analysis relevant and necessary to make an informed decision. All information and analysis in the public comment and in this Comment Analysis Report that is used by the Council as a basis for its final action will be included in the Final EIS prepared for the Secretary of Commerce to take action to approve the FMP amendment and the final rule implementing the Council's recommendation.

Comment 1-17: The deficiencies in the evaluation of the preferred alternative are highlighted by NMFS using this DEIS to provide suggestions for ways in which the Council might address them. DEIS at 63-71. The NEPA process is designed to ensure "that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts [and] that the relevant information will be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision." Dep't of Transp. v. Public Citizen, 541 U.S. 752, 768 (2004) (citation omitted). Providing feedback to an advisory body is not one of these enumerated purposes. NEPA and CEQ require consideration of alternatives as "the heart of the environmental impact statement."

Response: NMFS disagrees that discussing open-questions and potential flaws in alternatives in the EIS is an inappropriate use of the NEPA process. Under the MSA, the fishery management councils serve a variety of functions, including preparing fishery management plans and amendments thereto. 16 U.S.C. § 1852(h)(1). Under consideration at this time is an amendment to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area. At its June 2008 meeting, the Council developed Alternative 4 as its preliminary preferred alternative. In analyzing that alternative, NMFS staff identified three issues that needed to be resolved to avoid inherent ambiguities in implementing Alternative 4. By proposing and analyzing options to modify the Council's preliminary preferred alternative, NMFS provided the public, interested persons, and decision-makers with important information for considering and improving an alternative in the DEIS. NMFS believes that openly

discussing means to modify and/or improve alternatives within the DEIS itself is an appropriate and important aspect of the NEPA process.

Comments that DEIS is adequate

Comment 1-18: The DEIS contains a considerable amount of information necessary for managers to make reasoned decisions and for the public to understand the issues and tradeoff's available. However, there are areas where the analysis could be improved to ensure that decision-makers have the most recent and relevant information available. None of these changes should be construed as reasons to delay action before the Council on the issue of salmon bycatch reduction.

Response: NMFS acknowledges the comment. A number of public comments point out specific areas where changes should be made to the document. For those changes that NMFS agrees with, we have provided additional information to the Council and the public in this CAR and will incorporate this information and analysis in the Final EIS. Public comment also suggested a number of changes that NMFS disagrees with and the reasons why these changes will not be made to the Final EIS is provided in the response to those specific comments.

Comment 1-19: The DEIS adequately provides alternatives available to address Chinook salmon bycatch by the BSAI pollock fleet, recognizing constraints and limitations on developing a quantitative assessment of impacts. Analysis is limited by an incomplete understanding of the stock of origin and age distribution of the Chinook salmon taken as bycatch; interactions between pollock and Chinook salmon; relationship of Chinook salmon encounters in the pollock fishery with abundance; and expected changes and effect of changes in the behavior of the pollock fleet operating under bycatch management measures. The document effectively highlights these areas of incomplete understanding and relies on reasonable methods to inform decision makers and the public. We commend the authors for their comprehensive work and have offered suggestions for improving the document throughout its development. Public comments identify further needs for expansion and ADF&G will assist NMFS and the Council in responding to comments and in preparing the final draft. Working within constrains of unknowns and recognizing the NMFS Comment Analysis Report will bring additional information to the Council, the Council will have sufficient information in April to take action to reduce Chinook salmon bycatch in the BSAI pollock fishery.

Response: Comment acknowledged.

Comment 1-20: The DEIS is sufficient to take final action and does a good job of analyzing the effects of the caps and triggers closures given the best available science.

Response: Comment acknowledged.

Chapter 2 Comments

These comments are on Chapter 2, the alternatives, and monitoring and enforcement of the alternatives. An overview of each alternative is provided in the beginning of this Comment Analysis Report.

Comments on the alternatives in general

Comment 2-1: The DEIS does not describe options other than the alternatives analyzed that the Council may have discussed at its recent meetings or work-sessions.

Response: Section 2.6 identifies the alternatives considered but eliminated from detailed analysis and discusses the options recommended through the EIS scoping process and discussed by the Council. Many of the issues identified during the scoping process are presented in the current analysis; others were not carried forward for the reasons described in Section 2.6. This section also discusses the Council's process for developing alternatives, and those alternatives that were originally discussed at the Council level and through the Council's Salmon Bycatch Workgroup, but which, for the reasons noted in this section, were not analyzed in detail.

Comment 2-2: How do hundreds of options help inform the decision making process?

Response: The four alternatives analyzed in the DEIS represent different policy choices for how to manage Chinook salmon bycatch. Chapter 2 describes the alternatives. The alternatives analyzed in the DEIS generally involve limits or "caps" on the number of Chinook salmon that may be caught in the Bering Sea pollock fishery and closure of all or a part of the Bering Sea to pollock fishing once the cap is reached. Each alternative, except the status quo alternative, contains four components, and options for each component, to determine (1) the total cap amount and how to divide the total cap between the A and B season, and (2) whether and how to allocate the cap to sectors, (3) whether and how salmon can be transferred among sectors, and (4) whether and how the cap is allocated to and transferred among cooperatives. The DEIS provides both an analysis and discussion of the impacts of the four alternatives as a whole and a more detailed analysis of the various options and suboptions to inform the Council and the public of the consequences on the human environment. These decision points are necessary to understand not only the impacts but how the hard cap will function and the distributional differences among the many options.

Comment 2-3: Limit Chinook salmon bycatch restrictions to practicable measures that are reasonably calculated to reduce bycatch without resulting in a premature closure of the Bering Sea pollock fishery.

Response: NMFS acknowledges the comment.

Comment 2-4: To protect cultures and livelihoods through out the North Pacific, NMFS should implement a precautionary approach to reducing Chinook salmon bycatch in the pollock fishery that considers the potential impacts on salmon of changes in climate and marine species composition, ocean acidification, and planned offshore oil and gas development in the Arctic and the Bering Sea.

Response: NMFS acknowledges the comment.

Comment 2-5: Ensure that the hard cap does not confer to the pollock fleet ownership of, nor the right to take, salmon.

Response: NMFS agrees that a transferable allocation of a Chinook salmon bycatch hard cap to the sector or cooperative level would not convey ownership of that amount of Chinook salmon or the right to take those Chinook salmon.

Comment 2-6: With any new management scenario it is possible that the pollock industry will have additional incentives to underreport bycatch. Therefore, NMFS must enact measures to ensure proper reporting of Chinook salmon bycatch. Under any of the alternatives, the Council should require 100% observer coverage to avoid attempts to under-report salmon bycatch. Enumeration of every salmon is imperative for a program that relies upon individual vessel accountability.

Response: NMFS agrees and identified in Section 2.5 the concern that the alternatives could create an increased incentive to misreport salmon bycatch because the cost to the industry of reaching the salmon bycatch cap could be so high. Therefore, NMFS recommended that at least one observer should be required on each catcher vessel delivering to an inshore processor. In addition, NMFS identified that modifications to monitoring requirements for shoreside processors may also be necessary to adequately count the salmon bycatch delivered to these plants. Recommendations for modifications at the shoreplants do not include increasing observer coverage beyond the 100 percent coverage already required for these processors. Requirements for at least two observers on each catcher/processor and mothership would be maintained. Observers would continue to not be required for catcher vessels delivering unsorted catch to at-sea processors.

At this time, NMFS does not believe that enumeration, or physically counting each salmon, is necessary in all situations to estimate the number of salmon being caught. Observers onboard catcher/processors and motherships sample each haul for species composition and NMFS uses this data to estimate the number of salmon bycatch in that haul. This process is described in Section 3.1.1 of the DEIS.

Comment 2-7: The Final EIS should include a monitoring and enforcement implementation framework for NMFS to be able to efficiently and effectively manage, monitor, and enforce the preferred action. In order to understand how monitoring and enforcement would be carried out, it would be helpful to have specific information in the framework, such as estimates for full-time equivalents (FTEs), labor hours, and costs associated with implementation of the program. In addition, the framework should identify the types of computer models and assumptions that would be necessary to ensure that the accounting system accurately considers salmon allocations for rollovers and transfers.

Response: NMFS believes that the DEIS provides the necessary explanation about how NMFS will monitor and enforce the alternatives in Section 2.5 (pages 71 to 101), in Section 3.1 (pages 103 to 108), and in Section 10.5.7 (pages 710 - 720).

Comments suggesting new alternatives

Comment 2-8: Ban trawling in Alaskan waters for the sake of all fish species and communities that depend upon them because bycatch wastes millions of dollars and sufficient evidence links trawling to ecosystem damage. Trawling is an indiscriminate way to fish and there must be a better way to fish. The pollock trawl fishery is having enormous implications on our entire ecosystem and economy and the only way to reduce bycatch is to ban trawling. Close the Bering Sea pollock fishery until it can be proven that

trawling can be accomplished without destroying the Chinook salmon that Alaska communities depend on.

Response: An alternative to ban trawling or permanently close the Bering Sea pollock fishery is outside the scope of the action because it does not meet the action's purpose and need. The proposed action in the DEIS is to minimize Chinook salmon bycatch in the Bering Sea pollock fishery to the extent practicable while achieving optimum yield. Closing the pollock fishery would not achieve optimum yield.

Comment 2-9: To meaningfully address National Standard 9, a range of alternatives should be analyzed that includes options that will reduce bycatch below the historical average of 32,500 Chinook salmon to a more biological and culturally sustainable level. The hard cap should be 30,000 Chinook salmon, based on the 2009 ADF&G Yukon River Chinook salmon forecast and the obligations under the Pacific Salmon Treaty. This hard cap should decline over time, as bycatch reduction methods result in declining bycatch rates in the pollock fishery. This hard cap, while low compared to with most alternatives, is still too high given the poor state of Chinook salmon stocks in Western Alaska.

Response: A hard cap that declines below 29,323 Chinook salmon is not in the range of alternatives considered and the DEIS does not analyze the impacts cap levels below 29,323 Chinook salmon. See Table 1 in this Comment Analysis Report for the range of hard cap options considered. Section 2.6 on alternatives considered and eliminated from further analysis, discusses that the Council chose to limit the low end of the range of caps under consideration to 29,323 Chinook salmon which is representative of the 5 year average prior to 2001. Cap levels below 29,323 Chinook salmon were initially considered, but the Council felt that including this number was sufficiently conservative to meet the purpose of this action. The purpose of the action is to minimize bycatch to the extent practicable while, at the same time, achieving optimum yield. Based on the analysis in the DEIS, a cap below 29,323 Chinook salmon would impose substantial costs on the pollock industry without providing additional substantial Chinook salmon savings. Therefore, the Council and NMFS concluded that hard caps below 29,323 do not meet the purpose of the action.

Comment 2-10: Establish a stair-stepped cap, which would further reduce the hard cap over time. This declining cap would reduce salmon bycatch initially, while allowing the pollock fishery time to adapt their operations to these expectations. Reducing bycatch over time would increase the return of Chinook salmon to the rivers and escapement while also allowing the pollock fleet time to adjust their catch methods.

Response: Comment acknowledged. Adding a stair-step provision for Alternative 2 that includes the hard cap suboptions analyzed under Alternative 2, component 1, is an available option for the Council to adopt.

Comment 2-11: The hard cap should be no higher than 32,500 Chinook salmon with the goal to further reduce salmon bycatch. An annual review should be conducted to determine a lower cap. This review should include information of escapement goals and success in meeting those goals, reports on the status of subsistence, commercial and personal use salmon harvests, updates on the stock-of-origin of the bycatch, and new insights in ocean research. The cap should decline on an annual basis to less than 10,000 Chinook salmon over a few years.

Response: A hard cap that declines from 32,500 to 10,000 Chinook salmon is not in the range of alternatives considered. The DEIS does not analyze the impacts cap levels below 29,323 Chinook salmon or annual caps based on a consideration of a variety of factors. See response to comment 2-9.

Section 2.6 contains the discussion regarding alternatives considered but eliminated from detailed analysis, and it notes that the Council considered an index cap based on consideration of run-size impacts and a number of uncertain components (e.g. river-of-origin, ocean survival, future expected run size). Due to a lack of information and uncertainty in estimating these components, the Council did not think that the index cap formation was sufficiently developed to include as an alternative.

The Council also considered establishing a new cap on an annual basis; however, this would be extremely difficult, if not impossible, to implement successfully. The process first requires Council to make a recommendation and second requires NMFS to implement that recommendation through a rulemaking, which must comply with a variety of federal laws. NMFS expects that it would take more that a year for (1) for the necessary information to be collected, analyzed and presented to the Council, (2) for the Council to determine alternative cap levels that would then be analyzed according to NEPA and applicable law, (3) for the Council recommend to the Secretary of Commerce the alternative cap level that best represented the new information, and (4) for NMFS to implement the new cap level in Federal regulations. By the time the new cap level was effective, it would be based on outdated information and the current information may indicate that a different cap level is appropriate.

This comment did not provide the specific method by which to determine a cap based on escapement goals and success in meeting those goals, reports on the status of subsistence, commercial and personal use salmon harvests, updates on the stock-of-origin of the bycatch, and new insights in ocean research.

Comment 2-12: The initial cap should be set at 45,000 Chinook salmon for 2010-2011. This hard cap should change based on ADF&G estimates of abundance. If and when the escapement of Chinook salmon all along the coast returns to the biologically acceptable level for a period, then the allowable bycatch levels could be raised in proportion. If there is a hard cap on each boat, based on its pollock quota, there should be no increased problem of a race for fish.

Response: A cap of 45,000 Chinook salmon is similar to the cap level suboptions under Alternative 2; however, the DEIS does not analyze the impacts of caps set based on Chinook salmon abundance estimates. Section 2.6, Alternatives considered and eliminated from further analysis, discusses that the Council considered an index cap based on consideration of run-size impacts and a number of uncertain components (e.g. river-of-origin, ocean survival, future expected run size). Due to the uncertainty in estimating these components, the Council did not think that the index cap formation was sufficiently developed to include as an alternative.

Comment 2-13: The range of alternatives is awkward and inadequate because the status quo alternative really represents a hybrid approach which, under different scenarios, imposes entirely different and distinct bycatch management rules and regulations. It is essential for the analysis and decision-making process to treat the cap and closure provisions of Amendment 58 and the VRHS ICA provisions of Amendment 84 as two separate and distinct "stand alone" alternatives. Each of those alternatives could then be evaluated on its own merits and compared and contrasted with Alternatives 2, 3 and 4.

The hybrid nature of the status quo alternative makes analysis difficult and confusing and complicates efforts to compare it with the other competing measures. Status quo involves (1) a pre-determined closure area that is triggered whenever total Chinook bycatch in the pollock fishery reaches 29,000 fish implemented under Amendment 58 and (2) a waiver, implemented under Amendment 84, of the cap and closure as long as the industry has agreed to and is operating under what is known as the VRHS. In order to qualify for such a waiver, the VRHS must have been implemented via an ICA that closes pre-

determined "hot-spot"' areas to those vessels failing to comply with bycatch limits and rules embodied in the VRHS ICA itself.

Amendment 58 was the extant Chinook bycatch management system at the time the US Canadian salmon treaty was signed in 2002 and clearly complies with both the letter and spirit of that treaty that require the US to "maintain" efforts to reduce bycatch of Yukon River salmon. Amendment 58 is a proven management measure that best balances the legal requirements of National Standard 1 and 9. Bycatch levels experienced in those years that Amendment 58 was in place were significantly lower than the bycatch levels experienced recently.

Amendment 84 involves an entirely different approach to Chinook bycatch management. Whether or not the increased bycatch levels experienced since Amendment 84 was implemented represent a failure of the VRHS or simply some other set of dynamics that have resulted in higher Chinook encounters remains to be seen. Nevertheless, some have argued that current bycatch levels have been too high and that the current system violates the spirit if not the letter of the US obligations under the US/Canadian Treaty.

Response: Alternative 1 in the DEIS represents the current regulations that manage Chinook salmon bycatch in the Bering Sea pollock fishery. Section 2.1 of the DEIS describes Alternative 1, the status quo alternative, as the current regulations implemented under three amendments to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area, Amendment 21b, Amendment 58 (which modified the previous Amendment 21b closure areas), and more recently Amendment 84.

The Environmental Assessment/Regulatory Impact Review/Final Regulatory Flexibility Analysis for modifying existing Chinook and chum salmon savings areas analyzed, as Alternative 1, the trigger closure of 29,000 Chinook salmon implemented under Amendment 58 and also analyzed, as Alternative 3, the program implemented under Amendment 84. This document is available on the NMFS Alaska Region website at: http://www.fakr.noaa.gov/analyses/amd84/Am84_EARIRFRFAfr.pdf. Therefore, the provisions of Amendment 58 and Amendment 84 were previously analyzed as stand alone alternatives in a NEPA document.

Based on that analysis, the Council did not find that the Amendment 58 measures best balanced the legal requirements of National Standard 1 and 9. Instead, the Council recommended, and NMFS implemented, Amendment 84 which was an exemption to the closure areas for pollock vessels participating in the VHRS ICA. As explained in that analysis, Amendment 84 was developed to address concerns that the closures were no longer effective at reducing bycatch as the fleet was experiencing increases in Chinook salmon bycatch after the regulatory closure of the Chinook Salmon Savings Area (ChSSA) with Chinook salmon bycatch rates in some cases higher outside of the savings area than inside of the savings area.

In refining alternatives for the DEIS, the Council considered a wide range of time/area closures similar to the previous ChSSA but based upon updated bycatch information. Analysis brought forward in the development of candidate closure area alternatives indicated that while some areas of the previous ChSSA currently contained average areas of high bycatch (per design of previous areas), not all of the areas with high seasonal levels of bycatch in recent years were contained within the ChSSA. Therefore rather than re-considering this as a separate closure alternative, the Council chose to evaluate new closure areas under Alternative 3 that were more responsive to current spatial and temporal patterns of bycatch. These areas are specifically designed to be triggered by a seasonal cap level (as with the ChSSA).

For a discussion of the Pacific Salmon Treaty, please see the responses to comments 1-9, 1-10, and 1-11.

Comment 2-14: The DEIS should have considered an alternative in which fishing vessels would be required to pay a set amount for each salmon caught. Such as system would create an incentive to fish below the cap and could generate revenue for the necessary research. The economic penalties for the BSAI fishing industry must be implemented and strictly enforced to prevent high Chinook salmon bycatch. The penalties should apply to the individual trawl vessel and not across the fleet or industry.

Response: The DEIS does not analyze an alternative containing provisions for fees or economic penalties for Chinook salmon bycatch by Bering Sea pollock fishing vessels because such provisions do not meet the purpose and need for this action because they do not comply with the Magnuson-Stevens Act. Section 2.6 of the DEIS explains that the Council considered a fee per salmon caught to provide an incentive to reduce bycatch and to support research assessing impacts and methods to further reduce salmon bycatch. However, the Magnuson-Stevens Act provides NMFS limited authority to impose fees. Section 304(d)(1) specifically limits the amount of fees to "the administrative costs incurred in issuing the permits." Similarly, in the context of limited access privilege programs, NMFS and the Council must impose fees "that will cover the costs of management, data collection and analysis, and enforcement activities." Thus, the Magnuson-Stevens Act does not authorize NMFS or the Council to impose a fee on a per-salmon basis or collect fees to support research for reducing salmon bycatch. In addition, NOAA General Counsel also advises that NMFS cannot require that an ICA contain management measures that NMFS does not have the authority to require directly. Therefore, NMFS cannot implement regulations that would expressly require a salmon bycatch ICA to include fees on salmon bycatch, even if such fees were not directly assessed by NMFS.

Comment 2-15: The pollock industry should bear the cost of both improved sampling and analysis for genetic studies on the Chinook salmon stocks impacted by the fishery's bycatch. This should be tied to the economic incentives to improve the commercial fishery.

Response: An alternative that would have the pollock industry pay for improved sampling and genetic studies is outside the scope of this action because it does not directly meet the action's purpose and need. Economic incentives are addressed in the response to comment 2-14.

Comment 2-16: Develop and fund a comprehensive research program to adaptively manage Western Alaska salmon at all life-stages. This gravel-to-gravel research plan should emphasize hiring and development of local expertise and include community-based salmon research like habitat assessments, integration of traditional knowledge, in-river and ocean sampling for genetic stock identification, and the temporal and spatial use of ocean habitat. Research should also include identification of the stock-of-origin and age of all Chinook salmon caught as bycatch. This commitment should include funding the genetic stock identification of salmon caught as bycatch in the pollock fishery, marine research such as the BASIS program, and funding in-river enumeration and management.

Response: An alternative to develop and fund a comprehensive research program is outside the scope of this action because it does not directly meet the actions purpose and need to minimize Chinook salmon bycatch to the extent practicable while achieving optimum yield in the Bering Sea pollock fishery.

However, NMFS agrees that continued research on salmon at all life stages is desirable. In addition, the Council's 5-year research priorities, available on the Council web page at: http://www.fakr.noaa.gov/npfmc/misc_pub/ResearchPlan1008.pdf, identifies "stock delineation for estimation of adult equivalence to appropriately account for the impact of incidental catches of salmon in

pollock fisheries on salmon populations" as a research priority.

Stock identification studies

Stock identification of salmon will require adequate funding and a scientifically defensible sampling plan for determining stock composition estimates that are representative of the entire bycatch. Funding for NMFS to genetically analyze any bycatch samples is currently lacking. Limited funding ($60K for 1 year) has been obtained from the Alaska Sustainable Salmon Fund to analyze the 2008 tissue samples collected by the North Pacific Groundfish Observer Program (NPGOP) to support a feasibility study at Auke Bay Laboratories. Changes have been made to the NPGOP tissue sampling procedures for the 2009 season that will provide for increased numbers of tissue samples for analyses. However, further refinements to the sampling protocols may be required in the future before stock composition estimates representative of the entire bycatch can be completed. Given substantial financial resources and a sampling plan designed for the purpose, seasonal estimates of the stock composition of the samples would be possible.

Bering Sea salmon survey research

The following summarizes NMFS current and planned future salmon research. Standard research surveys by the Alaska Fisheries Science Center, the Bering-Aleutian Salmon International Survey (BASIS) research group in the Bering Sea have sampled the epi-pelagic fish communities within the northeastern Bering Sea (2002 to 2007) and Chukchi Sea (2007) from nearshore (> 20 m) to greater depths (100 m) offshore during late summer and early fall. These surveys provided much needed data for our understanding of how ocean conditions affect growth and marine survival of Pacific salmon, forage fish, and other commercially important fish species such as walleye pollock and Pacific cod after their first summer at sea.

For Yukon Chinook salmon populations, BASIS data provided:

- stock-specific catch data throughout the entire Bering Sea:
- relative abundance of juvenile Chinook salmon off the Yukon as well as relative abundance of co-occurring pelagic fish species;
- indicators of juvenile Chinook salmon health, including size, diet, and energy density; and
- biological (i.e., zooplankton samples) and physical (i.e., sea temperature and salinity) oceanographic parameters.

The BASIS data have been used to:

- build a new Yukon River Chinook salmon migration model;
- examine the relationship between juvenile Chinook salmon relative abundance and bycatch numbers as well as adult returns; and
- determine the consequences of climate variation and cycles on the health (survival), distribution, and migration pathways of juvenile Yukon River Chinook salmon.

The AFSC no longer funds BASIS research surveys off the Yukon River, so our 5 year data set limits our statistical power to address some of the issues related to number 3 above as well as Chinook salmon bycatch.

Comment 2-17: Secure adequate funds to ensure rebuilding and sustainable Chinook salmon escapement through comprehensive management and co-management of salmon by managing for all life-stages of salmon from in-river to estuary to ocean and return.

Response: Measures to manage Chinook salmon are outside of the scope of the action. The proposed action in the DEIS is to minimize Chinook salmon bycatch in the Bering Sea pollock fishery to the extent practicable while achieving optimum yield in the pollock fishery. ADF&G is responsible for Chinook salmon management and ensuring escapement. ADF&G is a cooperating agency in the analysis to provide the expertise necessary to understand the impacts of ocean bycatch on Chinook salmon escapement and abundance.

Comment 2-18: Expand the food bank program to distribute salmon bycatch to Western and Interior Alaska communities. This distribution would by no means be considered a substitution or replacement of the in-river subsistence fisheries.

Response: The Prohibited Species Donation (PSD) Program is a voluntary program needing participation from the fishing industry and the approved distributors. There are no regulatory barriers to the PSD Program distributing salmon bycatch to Western and Interior Alaska communities. However, expansion of this program in this manner requires efforts from the industry, any approved distributors, and people and organizations in western Alaska. Any organization that can meet the requirements for a PSD program permit may apply to NMFS. To date, only one authorized distributor, SeaShare, is permitted to handle donated salmon. Because of the logistics of handling and shipping the fish, only Pacific Northwest residents have benefited from the donated salmon. Having an authorized distributor that could provide donated salmon to Western Alaska communities would be a good way to reduce salmon waste in the pollock fishery. More information about the PSD program is available at: http://www.fakr.noaa.gov/ram/psd.htm. NMFS agrees that a donation program for salmon cannot be considered a substitute to the nutritional and cultural importance of in-river subsistence fisheries. Fresh salmon harvested and processes in traditional ways from a river cannot be replaced by a frozen product with no traditional links.

At its February 2009 meeting, the Council expressed interest in modifying this program to mandate full participation. Any amendments to the PSD program would be analyzed in the future as a separate action.

Comment 2-19: Continue studies on bycatch reduction, such as salmon excluder devices and the effect of fishing tow speed and depth on salmon bycatch

Response: NMFS acknowledges this comment and notes that while explicit continuation of studies is outside of the scope of this analysis, investigations such as the work on salmon excluder device and evaluations of temperature, tow speed and depth are on-going studies whose results are expected to inform management decisions in the future (section 5.4).

Comment 2-20: Close known salmon migrating areas to trawling.

Response: This alternative is not analyzed in the DEIS. Based on a preliminary analysis using information in the DEIS, a closure of the migration areas would not be effective at minimizing bycatch and therefore would not meet the purpose and need for this action. The known migration pathways for Chinook salmon are identified in Figure 5-3 (pg. 201). Comparing the map of the migration pathways with the map of the location of pollock biomass in Figure 4-1 (pg. 160), it appears that pollock does not occur in the migration pathways. Also, the migration pathway area is not included in the area closures in

Alternative 3, which are based on where 90% of the Chinook salmon bycatch occurs in the pollock fishery. See Figure 1 and Figure 2 of this comment analysis report for the Alternative 3 proposed area closures.

Comments on status quo – Alternative 1

An overview of Alternative 1 is provided at the beginning of this Comment Analysis Report.

Comment 2-21: The VRHS system as currently implemented (including the A season fixed closure) provides adequate protection for Chinook salmon in low encounter years. The high encounter failings of the 2007 program were partially addressed in the 2008 revisions, and a hard cap to limit total take would complete the package.

Response: NMFS acknowledges the comment.

Comment 2-22: The status quo and Amendment 84 has not effectively reduced or minimized bycatch of Yukon Chinook salmon stocks. Salmon bycatch has increased despite Salmon Saving Area closure and VRHS ICA.

Response: NMFS acknowledges the comment.

Comments in support of a hard cap – Alternative 2

An overview of Alternative 2 is provided at the beginning of this Comment Analysis Report

Public comments provided the following general comments on a hard cap:

- Immediately set a hard cap of the lowest number of salmon bycatch to protect western Alaska Chinook salmon.

- In light of the current state of the Yukon River Chinook salmon and the salmon-dependent people of western Alaska, it is essential to put a hard cap on Chinook salmon bycatch immediately. The weak Chinook run of 2008 has already created problems of crisis proportions along the Yukon River. While subsistence restrictions limited the amount of food available for the winter, the lack of a commercial Chinook fishery cut off one of the only sources of income for many Yukon River residents. These restrictions combined with high fuel costs result in a serious burden on subsistence fishermen. The promise of the same or worse Chinook salmon returns in 2009 is no comfort.

- Set the cap considering that other fisheries have Chinook salmon bycatch that won't accrue against this cap.

Public comments suggested that the following hard cap alternatives be chosen as the preferred alternative:

- **29,323 Chinook salmon:** Immediately implement a hard cap of 29,323 Chinook salmon (Alternative 2, Option 1, suboption viii, see Table 1). This is the only proposed bycatch cap that uses the average bycatch numbers for the 5 years prior to the United States-Canada Yukon River Salmon Agreement of the Pacific Salmon Treaty, 1997-2001, which requires the U.S. to increase

in-river returns of Yukon River origin salmon by reducing marine catches and bycatches. This alternative would best ensure that Chinook salmon are returning to western and interior rivers to meet spawning escapement and subsistence needs.

- **30,000 Chinook salmon:** It is important for the conservation of Chinook salmon and the welfare of salmon-dependent villages that the cap is set no higher than 30,000 Chinook salmon, based on the cap level in Amendment 58. A 30,000 Chinook salmon hard cap will help ensure the health of the Chinook fisheries that sustain and provide economic opportunities for Alaskan residents. Without such a cap there is not sufficient incentive for the pollock fleet to move forward with improved fishing practices that will minimize Chinook bycatch. The British Columbia example shows that hard caps are sufficient incentives to vessel owners to fish cleaner and to reduce bycatch.

- **30,000 Chinook salmon:** The simplest management scenario and the best course of action is hard cap with a seasonal distribution, no rollover, and no provisions for ICAs. To protect and conserve Chinook salmon, implement a hard cap of 30,000 Chinook salmon, with the Alternative 2, component 1, option 1-2 seasonal distribution of 58% to the A season and 42% to the B season, and the Alternative 2, component 2, option 1 sector allocation (10% to the CDQ sector, 45% to the inshore catcher vessel sector, 9% to the mothership sector, and 36% to the offshore sector, see Table 1). Alternative 3 and 4 will leave too many loose ends for the pollock industry to maneuver around in.

- **29,000 to 38,000 Chinook salmon**: A hard cap of 29,000 to 38,000 Chinook salmon represents the historic range of Chinook bycatch. This substantial reduction in Chinook salmon bycatch would rebuild the Yukon River salmon stocks so that, first and foremost, biological escapement needs would be met, the subsistence needs of Alaska and Canada would be met, and the Yukon and Kuskokwim rivers' commercial fisheries would return.

- **32,500 Chinook salmon:** Hard cap should not exceed 32,500 Chinook salmon in the pollock fishery coupled with a comprehensive salmon research and management program. While we recognize that there are a variety of programs including incentive programs, gear modifications, and time and area closure that may have promise for managing bycatch, these programs do not provide a rationale for allowing an annual hard cap of more than 32,500 Chinook salmon.

- **32,500 Chinook salmon:** Adopt a hard cap of no more than 32,500 salmon (Alternative 2, Suboption vii) immediately with the following options and suboptions; a.) A/B Season split: 58/42 (Seasonal Distribution Option 1-2); b.) Allocation to the co-op level with allocation based pro rata on pollock allocation (Sector Apportionment Option 1, see Table 1). The recommended A/B season split provides essential protections to maturing salmon which are bound for their natal rivers in the coming summer.

- **32,500 Chinook salmon:** The best way to prevent future excessive bycatch of salmon stocks throughout the North Pacific is through the implementation of an adequate precautionary cap, such as hard cap of no more than 32,500 Chinook salmon bycatch (Alternative 2, Suboption vii, see Table 1). Implementing this as a hard cap and not a management goal or "soft cap" would provide a level of assurance to communities affected by low Chinook salmon returns in 2008 and may have to face equal or lower returns in 2009. This hard cap is the ten year average bycatch prior to the signing of the Yukon River Salmon Agreement of 2002. Additionally, Chinook

salmon bycatch reached an all-time low in 2000 of 4,961 Chinook salmon but bycatch has steadily increased every year since.

- **37,000 Chinook salmon:** Implement, by emergency regulations, a hard cap of 37,000 Chinook salmon. When historic bycatch of Chinook salmon exceeds 37,000 Chinook salmon, escapements or harvests in the Yukon River have been less than expected, restricted, or reduced.

- **38,891 Chinook salmon:** Do not combined industry incentive programs with a cap level higher than 38,891 Chinook salmon. This action would increase the likelihood of Chinook salmon mortality, thereby decreasing the in-river returns and negatively impacting escapements and harvest opportunities.

- **40,000 Chinook salmon:** Based on experience with the Yukon River fishery, bycatch near 40,000 Chinook salmon appears to allow in-river escapement, subsistence harvest, and Canadian border passage goals to be achieved, while also providing for in-river commercial fishing opportunities. It appears when bycatch levels exceed 40,000 Chinook salmon, some segment of in river escapement or harvest is likely reduced. Therefore, based on review of the alternatives presented in the DEIS, a hard-cap of 38,891 Chinook salmon, beyond which the pollock fishery would close, would be most consistent with management responsibilities and the most likely to provide for the long-term conservation of Federal in-river Chinook salmon trust resources. This level would also be consistent with ANILCA.

- **40,000 to 50,000 Chinook salmon:** Implement Alternative 2 with a cap of 40,000 to 50,000 Chinook salmon. A low cap is necessary because a number of our river systems have escapement goals of less than 20,000 fish, such as the Naknek River, which has an escapement goal of 5,000 fish. With a high cap, the pollock fishery could inadvertently wipe out an entire season of Chinook fishing for all user groups in an area.

- **68,392 Chinook salmon:** A bycatch hard cap lower than 68,392 Chinook salmon would risk losing the pollock industry's ability to consistently fill contracts. Low caps would shut down the Bering Sea pollock fishery in unpredictable ways and times causing surimi buyers/users to seek alternative sources of supply that are more reliable.

Comments on time-area closures – Alternative 3

An overview of Alternative 3, include maps of the proposed area closures, is provided at the beginning of this Comment Analysis Report.

Comment 2-23: Closing the savings area is no longer a functional mechanism to avoid Chinook salmon bycatch. Chinook salmon distribution has changed such that more and more salmon are encountered outside of the savings area. For this reason the proposed management measure to impose seasonal closures of areas where high salmon bycatch has traditionally occurred should not be considered as an adequate enforcement tool to prevent Chinook bycatch in the BSAI pollock fishery. Area closures have proven to be an ineffective tool in reduction of overall bycatch.

Response: NMFS agrees that the current regulatory approach is no longer adequate to minimize bycatch. The exemption for vessels that participate in the VRHS ICA was implemented in response to the shortcomings of the Chinook salmon savings areas and as a first step towards the more comprehensive

measures analyzed in the DEIS. The Alternative 3 trigger areas were specifically designed as large seasonal areas representing where 90% of the Chinook salmon bycatch occurs to meet the goal of reducing bycatch in response to SSC concerns that the Chinook Salmon Savings Area has been found to be insufficient to reduce bycatch (pg. 99). Section 5.3.6 provides a detailed discussion of the potential of Alternative 3, triggered area closures, to change Chinook salmon bycatch amounts. NMFS disagrees that area closures cannot be enforced. NMFS believes that the DEIS provides the necessary explanation about how NMFS will monitor and enforce the alternatives, including the area closures, in Section 2.5 (pages 71 to 101), Section 3.1 (pages 103 to 108), and Section 10.5.7 (pages 710 - 720).

Comment 2-24: Time/area closures of areas identified as having high rates of Chinook salmon bycatch are a simple management measure that has proven effective in other Bering Sea fisheries. NMFS should modify these time/area closures as necessary, based on new bycatch data as it becomes available. Vessels should not be exempt from these time/area closures for any reason.

Response: The Alternative 3 triggered area closures are based on areas of high Chinook salmon bycatch rates, as explained in section 2.3. The Alternative 3 trigger areas were specifically designed as large area representing where 90% of the Chinook salmon bycatch occurred. Alternative 3 does not contain a provision to exempt vessels from the area closures or to adjust these areas based on new bycatch data. Adding a provision to adjust the closure areas based on new information would require additional analysis.

Comment 2-25: Close areas where high Chinook bycatch rates occur during time periods when bycatch rates are high and a hard cap is projected to be exceeded, for example when there is increased Chinook bycatch during the month of October. Some closed areas may change seasonally, whereas others may be closed indefinitely. Regulations and programs must address existing hot spots and new hot spots during the fishing season.

Response: Alternative 3 provides triggered seasonal closure areas which are explicitly designed in areas where 90% of the Chinook bycatch has occurred between 2000-2007. These areas would be triggered by a cap level as specified in component 1 of Alternative 3. As the analysis relates, some of the trigger cap levels would close these areas in the B season prior to the month of October. This alternative does not however allow for indefinite closures, each closure is designed seasonally and would reopen the following season and remain open until a trigger cap level is reached. Fixed closures were initially considered under the development of Alternative 3 candidate closures. The SSC recommended that they not be considered in this analysis as they have not proven effective previously (section 2.6). This was validated by analysis of candidate regions during the development of alternatives which showed temporally and spatially variable bycatch patterns by season.

Comment 2-26: Do not implement locked-in targeted area closures because there is too much noticeable movement of pollock stocks to make that feasible.

Response: NMFS acknowledges the comment.

Comments that support Alternative 4

An overview of Alternative 4, the preliminary preferred alternative, is provided at the beginning of this Comment Analysis Report.

The following public comments support Alternative 4:

- Implement the PPA2 hard cap of 47,591 Chinook salmon in 2011, and do not delay action. In the analysis of how the different alternatives will affect minority or low income communities (table 9-8 through table 9-13), PPA2 seems to be the most effective in reducing salmon bycatch for Chinook salmon users and other marine resource users in the six regions analyzed. It also states that adopting such a hard cap may reduce bycatch for seabirds and marine mammals. This may compound benefits of salmon bycatch reduction because the reduction in bycatch for other species may directly benefit Alaska Natives and other indigenous peoples of the North Pacific who subsist off of these species. Furthermore the analysis speculates that such Chinook management measures 'are likely to slightly reduce chum salmon bycatch' and that PPA2 may also reduce groundfish bycatch. This approach seems most consistent with National Standard 9, which states that "Conservation and management measures shall, to the extent practicable, minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of such bycatch," particularly in the context of achieving environmental justice. A cap of 47,591 would strike a balance between National Standard 1 and National Standard 9, both allowing the pollock fishery to continue and minimizing bycatch. A cap at this level would address the long term health of the Chinook salmon.

- The following measures show great promise in reducing Chinook salmon bycatch; reasonable limits on Chinook bycatch, the use of salmon excluder devices in pollock fishing nets, rolling hot spot closures, and intercooperative agreements that help reduce bycatch and penalizing fishermen who have high bycatch levels.

Comments opposing Alternative 4

An overview of Alternative 4, the preliminary preferred alternative, is provided at the beginning of this Comment Analysis Report.

The following public comments suggest that the PPA1 hard cap of 68,392 Chinook salmon is too high:

- Salmon dependent communities and ecosystems in the Pacific Northwest, Alaska, and Canada are being harmed by the current management plan and will be harmed more with the PPA. The 68,393 hard cap alternative is higher than average bycatch (pg. 244) of 49,600 Chinook salmon. This estimate is reminiscent of the destruction foreign fleets caused.

- The high cap of 68,392 Chinook salmon is not justified and is too high for conservation reasons. The direct correlation between encounters and abundance is not borne out by the analysis, yet that underpins the argument for a higher cap in exchange for an incentive plan. It's fairly clear that the recent high encounter years are due to other factors, such as increased overlap in the ranges of Chinook and pollock, as the DEIS notes. In years when high encounters don't correlate with high abundance, a higher cap simply translates to a higher rate of interception and larger impact to the other users of Chinook and to the resource. Low encounter years don't necessarily correspond to low abundance either, and there are other effective ways to limit bycatch at those times, such as the current VRHS system. Additionally, the industry has only hit that amount twice in 30 years so it would not stimulate avoidance of salmon bycatch in most years.

- Neither of the hard cap amounts in the PPA (68K and 47k) represents a reduction in Chinook salmon bycatch, but rather an allowance for higher bycatch. Therefore, the PPA should not be adopted, as subsistence users would likely continue to experience difficulty meeting their Chinook salmon needs.

- As noted in chapter 2 of the DEIS, given that it is possible that the pollock industry may still exceed a hard cap of 68,000 Chinook salmon bycatch under the proposed alternative and that the incentives envisioned may prove elusive, PPA1 does not provide a reasonable alternative to reduce salmon bycatch within the National Standards.

- We are frustrated with NMFS's methodology in selecting its preliminary preferred alternative of a cap somewhere between 47,591 and 68,392 Chinook salmon. This range of caps represent averages that, if continued would only ensure that the status quo level of salmon bycatch would continue to occur and not be reduced as the MSA requires.

- In any alternative scenario, a cap of 68,392 has the effect of maximizing bycatch rather than minimizing bycatch. The pollock industry acknowledges that the hard cap of 68,392 Chinook salmon will likely still be hit. Even though a cap at this level would only have been exceeded 2 times in the last 20 years, a cap of 68,392 is not reasonable or prudent. Precautionary measures are necessary to conserve the Yukon River Chinook salmon and are required under MSA National Standard 9 and the Yukon River Salmon Agreement.

- A 68,392 Chinook cap is excessive and the incentive program conceptually does not ensure that bycatch will be held at levels significantly below 68,392 Chinook salmon. Furthermore, after listening to the pollock industry's presentation on incentive programs, we are not at all confident that the plans will successfully drive down salmon bycatch to low levels. The incentive programs contemplated are interesting creative approaches but as long as the cap is high and the direction to industry is unspecified, what motivation does the industry have to challenge themselves? The alternative only says that bycatch reduction below the cap should be "as far as practicable." The industry will define what is practicable for them based on how much they are willing to sacrifice. What is practicable for villages and their success at harvesting enough salmon for their needs will be ignored.

- If the incentive program works well then a cap lower than 68k should suffice. There is no greater incentive to reduce bycatch than a cap that reduces bycatch to the historical average (1992 to 2001) prior to 2002. The ICA cannot be analyzed historically to determine its effectiveness, nor can an analysis be done to determine its effectiveness in the future.

Public comments provided the following viewpoints on the ICAs:

- Because the ICA and Incentive Plans are still under development and may continue to be so until fall of 2010, the ICA is difficult at best to evaluate. Because the proposals continue to change as much as they do provides no comfort to the public that the Incentive Plans proposed today will have any resemblance to what we see when they are submitted to NMFS. Under these circumstances it is difficult to evaluate the efficacy of the current proposals let alone the proposals the Council will see at either final action or implementation. Both plans fail to meet the requirements and the intent of PPA1, nor is there any indication that they will meet those requirements by the time of final action or at implementation when an ICA would need to be submitted for approval. And once again, there is nothing to ensure that any ICA submitted to NMFS for approval would bear any resemblance to what the Council sees at final action in April. Therefore PPA1 should be rejected and PPA2 should be adopted. Nothing precludes the industry from doing any of the elements of any of the Incentive Plans that have been proposed outside the Council process - in fact, it may be in their best interest to do so.

- PPA1 also introduces additional conditions that create the incentive for secrecy and gaming at an unacceptably high hard cap. PPA1 provides for pushing sector and cooperative allocations down to the vessel level. While this is a laudable goal, it may have the unintended consequence of creating a disincentive to share information with other vessels, as 'I do better if you do worse' is a real consequence. One of the strengths of the current VRHS system is the active, real-time information sharing. An argument can be made that more restrictive cap allocations at the cooperative level will do more to get the fleet to work together and address bycatch as a team effort than incentive plans, especially if some companies can figure out how to game the system despite the best efforts of the rest of the industry. We are very concerned about potential gaming, especially with the Financial Incentive Plan/Undercatch Incentive Program. Some industry players have repeatedly demonstrated that they will push the envelope and actively game whatever the Council passes. This plan in particular lets large companies buy their way out of bycatch problems as just another cost of doing business. As there is no carryover effect from year to year, the cost of being below average in performance just gets dialed in as a cost. A simple cost-benefit analysis may also encourage vessels to continue to fish in areas with high bycatch rates at certain times because the penalty paid for salmon caught will still be less than the revenue generated targeting higher-value fish.

- We recommend that if PPA1 moves forward, explicit criteria for the content and evaluation of any ICA and its Incentive Plans be outlined in regulation. The guidance provided in PPA1 is so vague that it sets the bar very low. The PPA1 guidance is inadequate and the bycatch price offered for the ICAs is way too high. The plans are quite complex, and frankly we're having a hard time trusting the industry due to some participants who appear to be operating in bad faith, despite the best efforts of the majority.

- If the preliminary preferred alternative is selected the performance of the incentive programs would not be subject to an objective evaluation. We are supportive of rewarding clean fishing and allowing industry room to apply innovative mechanisms to change behavior. However, leaving evaluation of the results up to vested parties does not serve the public interest. Furthermore the alternative does not require that the industry implement the same incentive program that has been presented. This irregular management approach presents serious problems from the standpoint of public policy and transparency.

- None of the incentive plans proposed to date provide enough additional disincentive in low encounter years to justify a higher cap and higher mortality in high encounter years. All incentive plans would also add significant and unnecessary complexity. Incentive plans alone also do not have the effect of flat out prohibiting a vessel from fishing in high bycatch areas. Trying to do this through financial disincentives is far less direct than simply closing those areas as under the hot spot system. That's why the incentive plans all include a substantial rolling hot spot system.

- Implicit in the selection of the PPA1 is the proposition that it is within the means of the fishing industry to reduce bycatch if sufficiently motivated. Little evidence is presented to support this conclusion. Absent evidence that bycatch avoidance is at least partially determined by decision on where, when and how to fish, it is not clear that any incentive program could actually work.

- PPA1 and the ICA requires strong faith that the industry will do the right thing for the salmon interests even when it's not in the pollock industry's best financial interest to do so.

- While the industry should be commended for offering to implement some of its own regulations and invest in methods to protect Chinook salmon, realistically, how would NMFS be able to execute a fishery if all participants are not on the same page? It would be dangerous and possibly unmanageable to have a portion of the fleet willing to cooperate under the ICA and fishing under one cap and the remaining portion fishing under a separate cap. It will cause dissension and unease among users. The alternative implemented should result in everyone playing from the same deck of cards.

- The Council's PPA1 includes measures developed, managed, and overseen by the pollock industry (the ICA component of PPA 1) that cannot be enforced or evaluated. The uncertainty surrounding the effects of an ICA, the lack of analysis, and the fluidity of the ICA itself suggest strongly that these measures should be removed from the PPA.

- Reject the industry incentive program proposals. Neither proposal can guarantee that it will achieve bycatch reduction to a level sufficient to warrant a cap of 68,000, more than twice that recommended by many Western Alaska and tribal groups. It is clear that both systems depend on boats to buy bycatch credits, or conversely a desire to keep bycatch levels down so as to avoid buying credits. Since a hard cap level of 68,000 has rarely been hit, 2006 & 2007 there is little incentive to buy credits or fear of losing them as the hard cap is unlikely to be hit.

- The current ICA proposals suffer from a failure of transparency, public participation, scientific rigor, and management oversight, and offer no assurance that salmon bycatch will be reduced. They should not be part of any alternative selected by the Council or agency at this time.

- PPA1 is not a viable option because of the reasons the Council's SSC spelled out at the February 2009 Council meeting.

- ICAs reviewed to date do not provide adequate incentives to change bycatch behavior. The proposed incentive programs that will be before the Council and NMFS when they take final action, will not necessarily be the incentive programs the industry submits prior to implementation of Amendment 91. Due to the changing nature of these proposals the Council cannot make an adequate review. It is unacceptable to adopt a management plan which includes industry incentive plans that can change at any time in the future. In effect, no one, including the

public, NMFS, and the Council has the opportunity to assess the efficacy of the final incentive programs submitted NMFS. NEPA requires that ICAs be analyzed as alternatives within the DEIS. The preferred alternative in the Final EIS cannot rely upon a voluntary program that has received no substantive review of its environmental and human health impacts on the EIS.

Public comments provided the following viewpoints on PPA2:

- The PPA cap of 47,591 is too low and could cause major harm to the industry and fishery-dependent communities. A total closure of the Bering Sea pollock fishery would threaten the viability of the City of Unalaska and other communities in the region.

- If the PPA2 cap 47,591 Chinook salmon is selected, bycatch will not be minimized but that number would basically sanction average years as acceptable. Also selecting this number rolls back the effect of the 1999 action which was expected to reduce bycatch from 48,000 to 29,000 Chinook salmon. Federal fishery managers should not start over but rather continue a rigorous program that improves fishery performance to minimize salmon bycatch.

- Even when coupled with triggered closures or incentive programs, a cap of 47,591 will jeopardize meeting the salmon escapement goals of the U.S. and Canada. This would continue to place the burden of conservation solely on in-river managers and fishermen while the marine fisheries continue unchecked.

Comment 2-27: The proposed incentive plans are not analyzed in the DEIS. The PPA analysis is inadequate because it does not evaluate the effectiveness of the ICA. The only major differences between annual scenarios 1 and 2 of the PPA are the incentive plans. Thus, the entire premise of the PPA is that bycatch will be reduced through the voluntary participation in the ICA. Reduction via the ICA is illusory and there is no analysis within the DEIS that supports its effectiveness. Therefore, analysis of the ICAs are a key factor to the decision making process. Analyze the ICAs before taking final action. Without analysis of incentive-based program proposals, it is difficult to assess the effectiveness of any proposed program to reduce salmon bycatch.

Response: It is not necessary for such an analysis to be included in the EIS for the Council to take final action because the Council did not establish any benchmark for measuring "the effectiveness" of the incentive programs. Rather, the PPA establishes either a dual hard-cap of 68,392 for ICA participants and 32,482 for non-participants (annual scenario 1) or a hard cap of 47,591 for everyone. Under annual scenario 1, the ICA participants could not exceed 68,392 on an annual basis (assuming the cap is modified so that it is a hard cap). Through the development of the ICA, the PPA allows them the flexibility to stay below or within this cap. The PPA, however, does not provide any guarantee or contain any requirement that the actual level of bycatch be below 68,392. It is therefore permissible, and arguably foreseeable, that this level of bycatch will occur each year that PPA (annual scenario 1) is in effect. Of course, if the Council adopts this approach, it will have to explain how it achieves the objectives of Chinook salmon bycatch management and complies with the national standards in the Magnuson-Stevens Act and other applicable law.

The Draft EIS also contains an explanation of the Council's general goals for incentive programs and the Council's intent to evaluate these programs once they are in effect and operational in the pollock fishery. This evaluation will be done through the annual report that will be required of the industry. Under the PPA, the annual report would be required to include: (1) a comprehensive explanation of incentive measures in effect in the previous year, (2) how incentive measures affected individual vessels, and (3)

evaluation of whether incentive measures were effective in achieving Chinook salmon savings beyond levels that otherwise would have been achieved in absence of the measures. Through these annual reports and its own assessment of future Chinook salmon bycatch levels under the PPA, the Council would determine the effectiveness of the incentive programs. If the PPA is adopted and if analysis prepared after the ICAs are in effect demonstrates that the Council's goals for salmon avoidance are not being met, the Council could reinitiate analysis of alternative salmon bycatch management measures and implement revised or new management measures in the future.

Analysis of the efficacy and impacts of the ICA and its salmon bycatch avoidance incentive programs are not required under NEPA because the environmental impacts of the PPA are determined by the cap level of 68,392 Chinook salmon. The impacts of the PPA on the human environment are based on the assumption that this level of bycatch could be reached in any year. Under the PPA, no regulations would prevent the pollock industry from reaching this cap. As long as the DEIS analyzes and discloses the consequences of adopting the dual-caps specified in the PPA (the 68,392 high cap and the 32,482 "backstop" cap), and the Council considers the ICA as an feature of the PPA that may provide additional incentives to avoid Chinook salmon bycatch within these cap levels, the Council can take final action without analysis in the DEIS of the specific incentive program the pollock industry may submit if the PPA were to be implemented by NMFS.

The two principal goals of an EIS are to (1) ensure that the decision-makers carefully consider detailed information concerning significant environmental impacts and (2) make sure that the relevant information will available to the public. The DEIS discloses the environmental impacts from instituting the PPA's bycatch hard cap levels. Additional reductions in Chinook salmon bycatch may occur as a result of the incentive programs, but this outcome is uncertain and not required by the PPA. Therefore, the DEIS assumes that no additional environmental benefits or impacts are anticipated from the implementation of the ICA. Consequently, the DEIS provides the decision-makers and public with the relevant information with respect to this bycatch reduction measure.

Comment 2-28: NMFS has failed to comply with MSA requirement by choosing to take no effective action to curb bycatch in the pollock fishery. Choosing to adopt a management structure dependent on an unproven, unenforceable, and unanalyzed industry agreement, as proposed in the PPA would not address this failure. The MSA, 16 U.S.C. §1801 et seq, is a mandate for "conservation and management" of our marine resources. 16 U.S.C.§1801(b)(1). The first enumerated purpose of the MSA is "to take immediate action to conserve and manage the fishery resources found off the coasts of the United States." This conservation mandate applies broadly to all stocks of fish and all fisheries. Against this backdrop, the MSA requires NMFS to take practicable actions to minimize bycatch. See 16 U.S.C. §§ 1853(a)(11); 1851(a)(9).

Response: NMFS is in the process of taking action to minimize bycatch to the extent practicable in the pollock fishery in compliance with the MSA and other applicable law. To ensure that the most effective and practical methods for controlling bycatch are implemented, NMFS needs to take the time to work with the Council and consider the concerns of the fishing industry, affected communities, and interested members of the public. NMFS also must meet obligations to analyze the potential effects of the action under the NEPA, Endangered Species Act (ESA), Regulatory Flexibility Act, Executive Order 12866 on regulatory planning and review, Executive Order 13175 on consultation and coordination with tribal governments, and Executive Order 12898 on environmental justice. As a result, it is likely NMFS will not be able to implement additional salmon bycatch management measures before 2011.

The PPA represents one of four alternatives under consideration. The ICA provision is one part of PPA1, the primary provision of which is a dual hard-cap of 68,392 for ICA participants and 32,482 for non-participants. Hard caps are proven bycatch controls that are enforceable and analyzed in the DEIS. The DEIS discloses the environmental impacts from instituting the PPA's bycatch hard cap levels. Through the development of the ICA, the PPA allows the pollock fleet the flexibility to stay within this cap. However, while additional reductions in Chinook salmon bycatch may occur as a result of the incentive programs, this outcome is uncertain and not required by the PPA. Therefore, the DEIS assumes that no additional environmental benefits or impacts are anticipated from the implementation of the ICA. See response to comment 2-27.

The DEIS also contains an explanation of the Council's general goals for incentive programs and the Council's intent to evaluate these programs once they are in effect and operational in the pollock fishery. This evaluation will be done through the annual report that will be required of the industry. Under the PPA, the annual report would be required to include: (1) a comprehensive explanation of incentive measures in effect in the previous year, (2) how incentive measures affected individual vessels, and (3) evaluation of whether incentive measures were effective in achieving Chinook salmon savings beyond levels that otherwise would have been achieved in absence of the measures. Through these annual reports and its own assessment of future Chinook salmon bycatch levels under the PPA, the Council would determine the effectiveness of the incentive programs. If the PPA is adopted and if analysis prepared after the ICAs are in effect demonstrates that the Council's goals for salmon avoidance are not being met, the Council could reinitiate analysis of alternative salmon bycatch management measures and implement revised or new management measures in the future.

Comment 2-29: The PPA allows for an unacceptable and unenforceable level of bycatch that will have significant adverse impacts on the western and interior Alaska way of life as well as the regional commercial salmon fishery.

Response: NMFS acknowledges the comment but disagrees that the PPA would allow for an unenforceable level of Chinook salmon bycatch. Under the PPA, the level of bycatch would be controlled by the hard caps. The DEIS provides the necessary explanation about how NMFS will monitor and enforce the alternatives in Section 2.5 (pages 71 to 101), Section 3.1 (pages 103 to 108), and Section 10.5.7 (pages 710 - 720).

Comment 2-30: Alternative 4 is not adequately analyzed in the DEIS. The PPA1 is described as a 68,392 Chinook salmon cap. As explained in the DEIS on page 65, however, the actual high cap on salmon bycatch under this alternative could exceed 100,000 Chinook salmon (68,392 salmon plus 32,482 under opt-out cap). The DEIS does not evaluate the effects of allowing bycatch to exceed 100,000 salmon and the impacts on subsistence and commercial fisheries.

Response: The DEIS, in Section 2.4.3.2, recognizes that without a change to PPA1, bycatch could exceed 68,392 Chinook salmon if vessels, sectors, or cooperatives opted out of the ICA. However, as explained in the DEIS, even if vessels, sectors, or cooperatives opted out of the ICA, it is unlikely that 68,392 Chinook salmon would be exceeded. If the Council recommends PPA1 without modifying it to make a 68,392 Chinook salmon a hard cap, the Council will need to explain how that alternative meets the purpose and need and weigh the risks of exceeding the cap with the benefits of the recommended program.

Comments suggesting changes to Alternative 4

Comment 2-31: NMFS has expressed concern over how to handle a situation where more than one ICA was submitted. We believe that only one ICA should be approved, and that this will ensure that industry works together to find real solutions rather than just easy solutions that fit any one user group. Should more than one ICA be submitted for a calendar year, NMFS should reject all ICAs and give the industry 30 days to work together to submit one comprehensive ICA that represents at some minimum percentage (90%?) of the pollock harvest. If the industry cannot reach a resolution, then the ICA will be rejected for the year and the lower cap will be allocated as outlined at final action.

Response: Comment acknowledged. Note that for the first year of implementation, it may not be possible to provide a 30-day period after the ICA deadline and still provide the necessary time between the effective date of the final rule and the pre-season requirements for the pollock fleet.

Comment 2-32: The DEIS identifies potential problems with PPA1 in the event that some entities opt out of the ICA and fish under the lower hard cap. Without additional clarification at final action, the 68,392 hard cap could be exceeded. Option B identified in the DEIS is the best resolution to this potential problem and we believe it to meet the intent of the Council motion. Option B would subtract from the 68,392 cap the portion of the 68,392 cap represented by vessels opting out and fishing under the backstop cap using the proportion of 32,482 represented by the vessels fishing under the backstop.

Response: NMFS acknowledges this comment. These options are described in the DEIS in Section 2.4.3.3, pages 65-66.

Comment 2-33: Consider an adaptive management approach to determine which components and options of the PPA would best support the purpose and need for this action. The selection of the preferred alternative should be based on sound scientific research, field data, and modeling information. A phased approach over a specified timeframe/schedule may be an effective way to implement the preferred alternative based on an adaptive management framework.

Response: All fishery management actions are intrinsically adaptive in the sense that the FMP is an on-going process of adaptive management. Monitoring is ongoing to collect Chinook salmon bycatch data, including river-of-origin and stock identification information. As scientific data indicates a need for a change in management course, NMFS and the Council will respond by initiating an FMP amendment analyses to evaluate different management strategies. The selection of the preferred alternative is based upon the best scientific data and analysis available to support decision-making at the time of final action. This does not preclude further changes to management actions at a later time should new information become available. A phased-in approach for implementing a hard cap was discussed at the Council but was not included in the PPA. (DEIS section 2.6).

Comment 2-34: There is no discussion in either of the industry-initiated Incentive Plans for monitoring and enforcing their program. We find this to be a serious flaw in both Plans. The Plans put forward are complicated, outside the public process, and ripe for gaming by the industry - it's a case of the fox watching the chicken coop. Should PPA1 be recommended to the Secretary, strong provisions for monitoring and enforcement of the rules imposed by the ICA should be required.

Response: An ICA is an industry agreement and its provisions would be monitored and enforced through the ICA and civil contract. NMFS would not have a role in monitoring or enforcing the express

provisions of the ICA. NMFS, however, will monitor the bycatch from each vessel and will, in the event the NMFS closes a fishery because the cap is exceeded, enforce compliance with such closure(s). The DEIS provides the necessary explanation about how NMFS will monitor and enforce the alternatives, including PPA1, in Section 2.5 (pages 71 to 101), in Section 3.1 (pages 103 to 108), and in Section 10.5.7 (pages 710 - 720).

Comment 2-35: Adopt PPA2 with a hard cap of no more than 32,500 salmon bycatch. This cap is equal to the ten year average of salmon bycatch in the BSAI pollock fisheries prior to signing the 2002 Yukon River Salmon Agreement. Thus, a hard cap of 32,500 is necessary and achievable. Given the forecasts for salmon returns in western Alaska in 2009 that project equal or lower salmon returns than the low returns of 2008, a hard cap of 32,500 salmon represents necessary insurance to the communities of the North Pacific who depend on salmon as a subsistence resource.

Response: NMFS acknowledges this comment. A hard cap of 32,500 is within the range of cap levels analyzed in the DEIS.

Comment 2-36: Adopt PPA2, with one change and two additions. (1) With respect to the sector allocations under a hard cap, allocating Chinook salmon based on 75% salmon bycatch history and 25% AFA pollock amounts the PPA allows sectors with the highest salmon bycatch a higher portion of the proposed allocation. The PPA weighted sector allocation formula should be reversed to 25% history bycatch and 75% AFA pollock. The PPA's use a blend of history and pollock allocation to addresses the issue that basing sector allocations on straight history rewards a bigger share of the bycatch cap to sectors with members that fish in October or otherwise have Chinook bycatch significantly higher than that of their peers. However, the history component needs to be reduced to 25% to wring out the differences in behavior. All other aspects of the sector cap calculations, specifically including the adjustment of CDQ and CDQ harvesting sector history as described in the Council's June 2008 motion, would remain unchanged.

(2) Add to PPA2 the Alternative 3 B season triggered closure, applied at the cooperative or entity level such that if October 7 or any date thereafter, an entity has met or exceeded its bycatch allocation, it is subject to the closure. The cap allocation would be calculated using the methodology of PPA2 modified by the change above, but for a cap level of 29,300.

(3) Add to PPA2 the status quo VRHS and exemption from the savings area closures such that the hard cap and triggered closure are in addition to status quo.

These changes will provide adequate protection for Chinook salmon stocks in low encounter years and will be much simpler to implement than the incentive plans currently being proposed. Overlaying a hard cap on the status quo shouldn't require significant analysis. The effects of the hard cap are already fully analyzed. The effects of the rolling hot spot system are fully analyzed. Putting the two together should provide effective low encounter avoidance under Status Quo and effective high encounter avoidance under the hard cap. It should be possible for the analysts to flesh out how the agency would implement that between final action and the final EIS without delaying implementation.

Response: Comment acknowledged. The suggested modifications to the seasonal sector-specific allocations differ from those explicitly considered in the alternatives, but are nonetheless within the range of sector allocations considered in this analysis. However some provisions of the area closure suggestions have not been considered in this analysis. While layering the area closure in conjunction with a hard cap is possible under the existing suite of alternatives, there are management complexities to be considered in

doing so that have been raised in previous Council discussions and were contained in the preliminary review draft (June 2008 Initial review version of the analysis).

Furthermore the commenter suggested that the B season area closure should be applied at the cooperative level. Application of area closures below the sector level (managed by NMFS) is not included in the existing suite of options due to the management difficulties raised in tracking cooperative-level caps and the challenges in enforcing cooperative level area closures for the Agency. Note that Alternative 3 component 2, option 1 provides for ICA management of a triggered area closure which could be applied under the ICA provisions at the cooperative level.

The combination of a B season area closure triggered by a lower cap in conjunction with the status quo system of VRHS program (with the exemption to status quo closures) and a hard cap divided by sector and season is possible under the existing suite of alternatives, but a more specific analytical discussion of the impacts of this alternative combination in conjunction with the existing analysis would be necessary following final action.

Comment 2-37: Any ICA that moves forward should be required to have a third-party conduct an annual analysis of the effectiveness of the ICA as it relates to the current problem statement and ICA criteria identified at final action. That analysis should be presented to the Council in an annual report for public review. The Council should also require scheduled review by NMFS of the proposed action after one, three and five years of the program to consider whether the program continues to meet Council intent and to consider new developments in the understanding of salmon biology and pollock fishing patterns. Should the program fail to prove more effective than a hard cap alone, the program would sunset.
To evaluate the efficacy of an ICA the following criteria should be required:

- Test fishing (up to 5% of the TAC) inside closed areas for the purpose of evaluating performance of the ICA against any Incentive Plan.
- Thorough explanation of the mechanisms for monitoring and enforcement of the ICA including any fee structure and the ultimate outcome for where those fees would be spent.

Response: Comment acknowledged. The PPA does contain general goals for the ICA and provisions for the Council to evaluate these programs once they are in effect and operational in the pollock fishery. This evaluation will be done through the annual report that will be required of the industry. Under the PPA, the annual report would be required to include: (1) a comprehensive explanation of incentive measures in effect in the previous year, (2) how incentive measures affected individual vessels, and (3) evaluation of whether incentive measures were effective in achieving Chinook salmon savings beyond levels that otherwise would have been achieved in absence of the measures. Through these annual reports and its own assessment of future Chinook salmon bycatch levels under the PPA, the Council would determine the effectiveness of the incentive programs. If the PPA is adopted and if analysis prepared after the ICAs are in effect demonstrates that the Council's goals for salmon avoidance are not being met, the Council could reinitiate analysis of alternative salmon bycatch management measures and implement revised or new management measures in the future.

Comment 2-38: The industry incentive program should begin working immediately and include funding, at a meaningful level, to support research relevant to salmon bycatch reduction.

Response: Section 2.6 of the DEIS explains that the Council considered a fee per salmon caught to provide an incentive to reduce bycatch and to support research assessing impacts and methods to further reduce salmon bycatch. However, the Magnuson-Stevens Act provides NMFS limited authority to impose fees. Section 304(d)(1) specifically limits the amount of fees to "the administrative costs incurred

in issuing the permits." Similarly, in the context of limited access privilege programs, NMFS and the Council must impose fees "that will cover the costs of management, data collection and analysis, and enforcement activities." Thus, the Magnuson-Stevens Act does not authorize NMFS or the Council to impose a fee on a per-salmon basis or collect fees to support research for reducing salmon bycatch. In addition, NOAA General Counsel also advises that NMFS cannot require that an ICA contain management measures that NMFS does not have the authority to require directly. Therefore, NMFS cannot implement regulations that would expressly require a salmon bycatch ICA to include fees on salmon bycatch, even if such fees were not directly assessed by NMFS.

Comment 2-39: The Council should evaluate each proposed incentive program with regard to the following: a) monitoring and enforceability; b) meaningful penalties for non-compliance, not simply a "trading" of credits or reducing or phasing out of participation in the fishery; and c) the inclusions of funding from industry for research that will help reduce salmon bycatch in the pollock fishery and meet escapement goals established by the Yukon River Salmon Agreement.

Response: NMFS acknowledges this comment. See also the response to Comment 2-38 that explains that the Magnuson-Stevens Act does not authorize NMFS or the Council to impose a fee on industry to support research.

Comment 2-40: Oppose transferability of Chinook salmon bycatch allocations between sectors or individuals. If the higher cap amounts are adopted, selling or trading the caps should not be allowed. Such activity would result in reaching the cap instead of providing incentive for the fishing industry to reduce bycatch below the cap. It is unconscionable to allow the pollock industry to buy and sell Chinook salmon allocations when it is illegal for subsistence salmon fishermen to do the same. Transferability would result in greater use of salmon bycatch allocations and will result in less salmon returning to the region's rivers and streams. Transferability would allow a vessel with low bycatch rates to transfer their unused bycatch allocation to a vessel with high bycatch rates, and the result is that both vessels' bycatch allocations of salmon may be taken. There would be no long term commitment or incentive to reduce bycatch.

Response: Comment acknowledged.

Comment 2-41: Regulatory and non-regulatory measures are necessary to reduce salmon bycatch. Support industry incentive programs that work with meaningful performance measures. Reward pollock boats reducing bycatch. Industry could fund such a program with dockside fees similar to the vessel buy-back program.

Response: The PPA does contain regulatory and non-regulatory measures to reduce salmon bycatch. PPA1 would establish in regulations either a dual hard-cap of 68,392 for ICA participants and 32,482 for non-participants or a hard cap of 47,591 for everyone. See Table 3 of this Comment Analysis Report. Under PPA1, the ICA participants could not exceed 68,392 on an annual basis. On the other hand, the ICA component would be largely a non-regulatory measure. As explained in section 2.5.4.1, page 93, the implementing regulations for the ICAs would include requirements for the information that must be included in the ICA and a deadline for submission of the ICA. In addition, the regulations would describe the process NMFS would use to review and approve or disapprove the ICA. However, the regulations would not specify any specific requirements for the type of incentives that must be included in the ICA. As non-regulatory measures, the ICAs could include rewards for boats to reduce bycatch or a system of fees. Note that, as discussed in the response to comment 2-38, NMFS does not have the authority to

impose fees on the amount of bycatch. Fees collected on bycatch are different than cost recovery fees necessary to pay back a loan, as under a vessel buyback program.

Comment 2-42: Do not allow the rollover of bycatch from A season to B season if the cap is 47,591 or higher, because these caps do not effectively minimize bycatch. A rollover could result in higher bycatch in the following B season. However, if the hard cap is 37,000 or lower, then a rollover provision would be more acceptable, because a lower cap will result in minimizing the overall bycatch.

Response: Comment acknowledged.

Comment 2-43: The Council should allocate more pollock quota to the CDQ groups because they have harvested pollock with lower Chinook salmon bycatch rates than the other sectors. Allocating relatively more pollock to the CDQ groups would promote clean fishing and penalize dirty fishing.

Response: The American Fisheries Act establishes the allocation of ten percent of the BSAI pollock total allowable catch to the CDQ Program. Because this allocation was established by Congress in a federal statute, the Council does not have the authority to increase the allocation of pollock to the CDQ Program. In addition, it would be difficult to confirm the statement that the CDQ entities have harvested pollock with lower salmon bycatch rates than the other sectors because operators of vessels harvesting both CDQ and non-CDQ pollock on the same fishing trip have the option of assigning a haul of pollock to either the CDQ entity's quota or to the vessels quota after the crew assesses the bycatch in that haul. NMFS regulations allow up to 2 hours after the fishing gear is retrieved to record the assignment of the haul in the vessel's logbook. Historically, because the CDQ entities were constrained by multiple hard caps for other groundfish species and prohibited species and the non-CDQ pollock fisheries were not, some CDQ entities would request that the vessel operators assign the lower bycatch hauls to the CDQ entity and the higher bycatch hauls to the non-CDQ pollock fisheries. This would result in it appearing that the CDQ entities were fishing with lower bycatch rates than the non-CDQ pollock fisheries.

Chapter 3 Comments

Comments on the AEQ methodology and genetics

Comment 3-1: The 68,000 cap is too high regardless of an incentive program's effectiveness and is unacceptable because it represents the average of the three highest bycatch years on record. If the all-time high year of 2007 is included as the basis for analysis, the low year of 2000 should also be included.

Response: The years used to calculate the caps which are based upon average bycatch over different time periods are different than the years chosen for the impact analysis. Section 2.2.1.1 (page 27) describes all of the iterative ranges of years employed in establishing a range of cap level alternatives. None of the cap options include the highest year of 2007 in calculation of historical averages. The option chosen in the PPA represents a three-year average 2004-2006. Other options under Alternative 2 have different year-sets included (3, 5, and 10 year averages before and after 2002). Option iv is specifically the 10 year average 1997-2006 with the lowest year (2000) dropped from consideration, while option vi is the same 10 year average but with 2006 dropped. These options are available for consideration at final action as well as analyzed in the impact analysis, but were not included in the PPA.

The years selected for the impact analysis are based upon consideration of current conditions and consistent data. As explained in section 3.2, the years 2003-2007 were chosen for the impact analysis because that is the most recent 5 year time period and most reflective of recent fishing patterns. Chinook salmon bycatch increased dramatically after 2002 and NMFS catch accounting changed after 2002 and thus starting in 2003, the most consistence and uniform data set was available from NMFS on a sector-specific basis for analysis. Note that the Chinook salmon bycatch information from 2000 is included in the DEIS. Section 5.3.1, in Tables 5-20 and 5-21, provides bycatch data from 1991 to 2008 to show how bycatch has changed over time and the variability in bycatch between years.

Comment 3-2: This method used to assess impacts on Chinook salmon and forgone pollock is unreliable because it assumes impacts from the highest bycatch years for the historical behavior (2003-2007) and it assumes no behavioral changes by the pollock fleet in response to hard cap. The methodology assumes that the retrospective behavior of the pollock fleet will be repeated under the various hard cap alternatives. The analysis is based on past performance of the fishery, but you should not assume that past amounts of bycatch would have the same impacts in future years. This assumption is inconsistent with the primary justification for the preliminary preferred alternative, which presumes adoption of incentives to change fleet behavior. The DEIS analysis of impacts on Chinook bycatch and forgone pollock catch is very likely incorrect because the pollock industry will make considerable efforts to avoid Chinook when faced with a hard cap, and that using historic bycatch with no savings due to avoidance measures greatly overstates the impact of a hard cap. This analysis could be improved by assuming a set percentage reduction in historical bycatch levels to account for the behavioral change a hard cap will produce.

Response: Using the time series 2003-2007 was selected since this reflects the most consistent and uniform dataset available from NMFS on a sector-season specific basis for analysis. NMFS acknowledges that the analysis does not account for any changes in fleet behavior that may result in bycatch levels below historical amounts. The analysis of impacts is structured based upon the 'worst case scenario' of sections of the fleet reaching their cap retrospectively over the year analyzed in order to estimate salmon

saved and forgone pollock and does not make any allowances for the fleet modifying their behavior to stay below the cap.

NMFS agrees there are issues with adequately predicting changes in fleet behavior, but disagrees that this represents a flaw in the analysis. Alternative predictive approaches (and data to support these approaches) are lacking and as such, the analysis notes that fleet behavior is likely to change, and the likely impact of changing fleet behavior is dealt with qualitatively. One approach would be to model potential changes in fleet behavior. However, such a model requires more information than is currently available. The SSC, in June 2008, noted in its review of the model methodology that "…while the calculated impacts in 2003-2007 are in one sense the worst case because they make no allowance for changes in fleet behavior, it is quite possible that in some future year the impacts on the pollock fishery could be even larger, even with changes in fleet behavior. This may occur simply because of a greater spatial overlap of Chinook salmon and pollock then seen in any of the years 2003-2007." Any set percent reduction employed to estimate behavior changes in response to a hard cap would be arbitrary and thus potentially uninformative in estimating true fleet operational behavior under a hard cap.

Comment 3-3: The Chinook salmon bycatch caps should be based on the strength of the projected Chinook salmon returns. There is no scientific data to support the use of bycatch data when compared to the use of projected returns. This method is similar to way the groundfish quota is set, based on percent of biomass. Successful fisheries have shown that the use of a projected run is more sound and then setting an allowable intercept for catch.

Response: NMFS agrees and setting the cap based on Chinook salmon abundance was considered extensively during the development of alternative management approaches. In discussions with the SSC over the years, options such as using BASIS surveys or other indices were considered. However, the data on future-year oceanic salmon abundances (preferably to river system) that would be required to manage salmon bycatch levels in this manner is lacking. Retrospectively, there is some evidence that salmon bycatch rates are positively correlated with subsequent salmon run-strengths but this relationship is variable and therefore cannot at this time be used as a basis for determining bycatch limits. (e.g., 2007 Chinook salmon bycatch encounter-rates were extremely high while run-strengths for a significant group of these fish was relatively low).

Comment 3-4: Two significant deviations in the DEIS from methods employed in all previous bycatch AEQ estimates were 1) the use of ADF&G's genetic (SNP) analysis (Page 111, last paragraph), instead of the traditional scale pattern analysis for determination of stock of origin; and 2) seemingly biased bycatch sample collections for the genetics studies (page 118 2nd paragraph). The SNP methodology underestimates the stock composition of Yukon River Chinook salmon and overestimates others such as the Alaska Peninsula stock over the years presented in the DEIS. The SNP analyses of bycatch used in the DEIS are unable to allocate fish stocks to the major drainages (Yukon, Kuskokwim, Columbia, etc) even though this is the primary metric for managing Chinook. Scale pattern analysis provides this information. Biased genetic tissue sampling in the 2005 B and 2007 A seasons is apparent and acknowledged in the DEIS, 'most genetic tissue sampling was completed prior to when most the bycatch occurred' and 'all of the 2007 samples came from a single vessel fishing in a closed area using experimental salmon excluder trawl gear'.

Response: NMFS disagrees. A revised section 3.3 is attached as Appendix 1 to this comment analysis report to further clarify the methodology employed in this analysis. For further information on the use of the SNP analysis as the primary determinant of stock of origin please see answer to Comment 3-5 where an explanation of the rationale for the most recent data is provided as well as further details on the use of

Myers et al. (2003) in this analysis. With respect to the apparent bias in sample collections, this is fully acknowledged and accounted for in this analysis (as opposed to a possible similar bias in Myers et al. study). Furthermore the 2007 A season data was downweighted considerably in its relative use compared to the other seasonal data due to these issues with sampling intensity. Further information has been added to section 3.3 regarding the weighting of each season as this was inadvertently omitted in the DEIS.

Comment 3-5: The DEIS repeatedly relies on preliminary or cursory studies to develop arguments that are of central importance to any proper evaluation of environmental impacts, without a clear presentation of how the limitations of those studies translate into uncertainties. The genetic data used to derive the estimates of Chinook salmon adult equivalent bycatch for the AEQ model relies heavily upon two poster presentations (Seeb et al. 2008; Templin et al. 2008) that have not been made publicly available or peer reviewed. The preliminary nature of these studies and the lack of an opportunity to fully review their methodology and sampling techniques makes their inclusion in the DEIS questionable. NMFS must make clear the extent to which the DEIS relies on information that is not peer reviewed. We recommend that the published Myers (2003) methodology be the sole methodology utilized by the DEIS.

Response: NMFS disagrees. The data and the methodology by which the data have been employed in this analysis are all fully explained in the text. Revisions to section 3.3 have been made (attached as Appendix 1) in order to clarify any additional details to the methodology that was not adequately explained in the DEIS. The only aspect to the studies that are not included in the DEIS are the methodologies by which the genetic data (single nucleotide polymorphisms SNPs) are analyzed and the specifics by which classification groupings are made as this is both outside of the scope of this analysis as well as proprietary pending publication by the geneticists involved in that study. However all details including the classification thresholds, river systems included in each group, as well as aspects of the data necessary for understanding their use in this analysis have been included in this draft, with additional details for clarification purposes included in the Final EIS.

Furthermore, the cited Myers et al. (2003) study, which was employed in this analysis for purposes of estimating impacts to the Yukon, Kuskokwim and Bristol Bay (as described in revised section 3.3) received a similar level of review and has not been published. The Myers et al. (2003) study result is presented in a final report of a multi-year project funded by the Yukon River Drainage Fisheries Association (YRDFA). This study had relatively high levels of sampling but simply assumed that sampling was proportional to bycatch in space and time. For the genetic study results used in the EIS, this was not assumed and sampling was adjusted to account for differences in proportionality.

The need to use a more recent time frame is important. Hence, the EIS focused on samples and results collected during 2005-2007 (see revised 3.3, in Appendix 1, for additional details on the time period for sampling over those years). Genetic results in aggregate for western Alaskan stock composition compared favorably with Myers et al. (2003) earlier work from 1997-1999.

Comment 3-6: The model used in the DEIS drastically underestimates the impacts to western Alaska Chinook salmon stocks and to Chinook salmon users.

Response: NMFS disagrees. For total salmon taken incidentally as bycatch, the sampling effort is very high by scientifically trained and certified who observe a majority of the catch in the pollock fishery. This indicates that the uncertainty in total removals of salmon are well known.

Relative to specific impacts to western Alaska Chinook stocks, NMFS acknowledges the uncertainty in estimating the stock composition of the bycatch. However, this study uses results from both genetics and

scale pattern analysis (which gave similar results relative to WAK stocks) to arrive at estimates. These approaches, combined with appropriate weighting schemes to account for sampling disparities, should provide unbiased estimates of the loss of salmon returning to western Alaska rivers due to pollock fishery bycatch.

Comment 3-7: The 2007 A season tissue collections have an unusually high proportion (55%) of age-4 Chinook salmon bycatch compared to the historic average of 30% (table 3-5). Younger fish tend not to be AYK stocks contrary to older fish. Historically, the A season bycatch has been dominated by older fish, AYK stocks, contrary to 2007 bycatch estimates. This results in misallocation and biased estimates of regional impacts in the DEIS (Table 3-8, Myers et. al. 2003). All prior AEQ impact analysis suggested the bulk of the AYK stock bycatch occurred in the A season, contrary to the DEIS (Table 3-11). This issue is compounded by the small genetic tissue sample size (N=360). Using an estimate of 1% of the 2007 A season bycatch tissue samples being AYK stock, so only 3 or 4 fish taken as A season samples (table 3.9) were of Yukon origin, suggesting a high potential for error due just to insufficient sample size. Earlier studies by Myers and others commonly had sample sizes greater than 1,000.

Response: NMFS disagrees and notes that the 2007 A seasons genetics collection were downweighted appropriately. The 2006 A-season samples genetics received 4 times the weight of the 2007 samples and the proportion of age 4 in 2006 was 30% (close to the average). The bycatch in the A-season is dominated by age 5 fish (51%) with ages 6 and 7 Chinook representing 15% on average while ages 3 and 4 are 35%. The age compositions are based on extensive length frequency sampling. While Myers sample sizes were relatively large, no attempt to correct for area and season specific sampling was done (they assumed that sampling was proportional to the actual bycatch by region and seasons). Further clarifications of methodology are included in the revised section 3.3 attached to this CAR.

Comment 3-8: In Section 3.3.2, the salmon genetics for non-western Alaska stocks are not in close agreement with the scale analysis, and there are questions concerning North Alaska Peninsula and upper Yukon contributions to bycatch. Please refer to Page 125 Table 3-12. The data for western Alaska stocks (Bristol Bay and north) from the three studies cited in the DEIS are reasonably consistent in the aggregate and are good enough to use as basis to protect those stocks. The extensive work done by the analysts to deal with the less than ideal sampling for the Seeb et al. study is to be commended.

Summing figures from western AK and Yukon segments (Seeb et al.) yields 54%, which is in reasonable agreement with the scale analysis done by Myers et al. at 56% and 60% for the core bycatch stocks. That said, there are some limitations to sampling methodology for the Seeb et al. study in particular, and the need for additional work characterizing the stock composition of the Chinook bycatch is obvious.

The North Alaska Peninsula contribution to the pollock bycatch, indicated by Seeb et al., seems highly unlikely, though if true could explain their very weak status. These stocks are quite small, and if the stock composition is true, they contributed 10,810 fish to the bycatch in 2006. This probably exceeds total run size for those rivers. The composition of the rest of the bycatch, totaling 40-46%, is quite variable. Do Cook Inlet stocks contribute 4%, 17% or 31% of the bycatch? Are Russian stocks 2%, 5% or 14%? Are Pacific Northwest stocks 0% or 23%?

Given this variability, it's also possible that the Upper Yukon stock components' migration patterns and degree of interception by the pollock fishery are not well understood. While it was 3% in the 2006 samples analyzed by Seeb et al., given these stocks' magnitude and importance, it may be prudent to assume that these stocks may not have shown up proportionally in the less than optimally collected, spatially and temporally limited samples analyzed. The Upper Yukon stocks might show up at higher

levels at other times and their interception rate may vary more than the core stocks. The last caveat may also apply to the North Alaska Peninsula, Pacific Northwest, Cook Inlet and Russian stocks.

Response: NMFS agrees that while there is consistency in relative stock composition estimates for aggregate WAK river systems between scale pattern and genetic studies, we note that there is considerable variability among the other stock composition estimates between studies. Table 3-12 highlights these issues. Additional text has been added to the revised section 3.3 to clarify the intent of the comparative table. Given these similarities and differences we note the following: the consistency in aggregate WAK core groupings between all studies supports the impact estimates for the aggregate groupings. Differences in stock composition estimates between studies for other regions were noted but given less emphasis in impact analysis for these regions (e.g., Cook Inlet, North Alaska Peninsula, Russia, Pacific Northwest) due to the variability between studies. This also lead to our conclusion that further study is required to better estimate stock composition for those regions.

Comment 3-9: The genetics and AEQ model provide reliable aggregate stock trend information, but do not accurately assess stock-specific impacts. Due to the inconsistencies associated with insufficient sample size, the genetic analysis should be used only to indicate treads across broad stock groups, such as WAK and should not be used for smaller stock groupings. Myers et al. (2003) should be used to break out the Coastal Western Alaska aggregate grouping. Given the importance of these stocks for treaty obligations, we cannot assume that the stock composition from the spatially and temporally limited samples analyzed by Seeb et al. are indicative of the overall presence of these stocks in the bycatch.

Tables 5-47, 5-48, 5-49, 5-50 and 5-51 should be amended to present information on an aggregate level.

Response: A revised section 3.3 is attached and includes further clarifications on the methodology employed and these are also reflected in the response to comment 5-6. Given the aggregate grouping of Coastal WAK from genetics, the results from Myers et al. (2003) was in fact used to break out this grouping (plus the added portions from the middle and upper Yukon) and provide gross river-specific impacts for the Yukon, Kuskokwim and Bristol Bay. No attempt is made in this analysis to discuss the middle and upper Yukon based on genetics alone for impact analysis, instead they are reaggregated as noted and only the Yukon as a whole system is estimated. In the DEIS, Tables 5-47 through 5-51 present the 9 genetic groupings while the specific river systems are shown in Tables 5-52 through 5-56.

Comment 3-10: The DEIS lacks sound data on the abundance and origin of Chinook salmon in the Bering Sea. This combined with uncertainty about how salmon ecology is linked to ocean conditions will force the Council to take action without the best science and research available to them and in doing so invite unintended negative economic consequences to the Bering Sea pollock industry and associated dependent communities. On-going research of such concerns is underway but has not yielded results.

Response: NMFS agrees that uncertainty exists in understanding the factors affecting Chinook salmon abundance and the relationship between bycatch mortality and in-river abundance. Identifying these uncertainties was a major scientific undertaking presented in the EIS. This EIS identifies the potential impacts of the alternatives on Chinook salmon and points to areas of uncertainty about those impacts. NMFS is actively taking steps to reduce uncertainty and better understand the river-of-origin of Chinook salmon caught as bycatch and ADF&G has ongoing research to estimate and understand the factors impacting in-river abundance. See response to comment 2-16.

Comment 3-11: In section 3.3.2, page 119, the DEIS states that ongoing work to identify the stock of origin of salmon bycatch is occurring. However, the description of sampling and study design is not included.

Response: NMFS appreciates the comment. Presently the Alaska Fisheries Science Center (AFSC) has developed a sampling strategy to improve genetic sampling done by observers. Additionally, ADF&G has contracted a review of sampling approaches for this problem. These efforts are underway and will improve future analysis of the type presented in the DEIS.

Comment 3-12: NMFS must include all relevant 2009 catch data, including Chinook salmon bycatch, in the Final EIS to comply with NEPA. Bycatch rates of Chinook salmon in the early stages of the 2009 pollock fishery are comparable to the 2007 when more than 120,000 Chinook were killed. By many indications, 2009 is shaping up to be another disaster for Chinook salmon bycatch.

Response: The Final EIS will provide the most recent Chinook salmon bycatch data up to the finalizing of the document, as the DEIS provided the bycatch estimates for 2008 prior to printing at the end of November. For 2009, the bycatch of Chinook salmon in Bering Sea pollock fishery was 8,768 fish, based on the March 7, 2009 catch report. NMFS posts the weekly catch reports of Chinook salmon bycatch in the Bering Sea pollock fishery on the NMFS Alaska Region website at: http://www.fakr.noaa.gov/2009/2009.htm.

Note that the 2009 estimates of Chinook salmon bycatch have been adjusted from the reports for the first weeks of the 2009 pollock fishery which used very preliminary data. A large amount of observer data were missing for this time period. Once the observer data were incorporated into the catch accounting system the salmon rates decreased and the bycatch numbers decreased. The 2009 rates are lower than the 2007 rates. For the same time period in 2007, the bycatch was 59,451 Chinook salmon in the Bering Sea pollock fishery.

Comments on the cumulative effects analysis

Comment 3-13: The analysis neglects to adequately acknowledge the cumulative impacts associated with climate change. Climate change represents one of the most ominous threats to Alaska's fisheries resources and cannot be ignored as it relates to changes in abundance, distribution, and the general ecological relationship of fish populations in the Bering Sea. Climate change could completely alter the ecology of the Bering Sea, resulting in significant acute and chronic effects on individual species and considerable population level effects among various species. Moreover, climate change could have substantial impacts on subsistence, beyond the population level effect it could have on various species. Increasing arctic temperatures and associated physical effects could compound and amplify the impacts large-scale commercial fishing in the Bering Sea. Section 3.4.1(Ecosystem-sensitive management) addresses climate change only by noting that current research in the Bering Sea might inform the process in the future, but fails to acknowledge existing research that would inform decision-makers and the public.

In light of the potential threats posed by climate change and its potential negative impacts on in-river salmon harvests, salmon bycatch, and the pollock fishery, it is important that the EIS address the issue in a systematic and transparent way in the context of cumulative impacts. Thus, the DEIS should take a hard look at the issue of climate change and how it may affect both the pollock fishery and its prosecution as

well as how it may affect salmon populations. The potential negative effects on both the pollock and the salmon fisheries resulting from climate change would argue for additional precaution in setting a cap for salmon bycatch. The public comment provide references the EIS also should consider in assessing the potential effects of climate change.

Response: NEPA requires a cumulative impact assessment on past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7). Global climate change can is a natural occurrence and, under NEPA, is not characterized as an "action"; therefore it is not a reasonably foreseeable future action. However, the DEIS does provide information on ocean climate change and regime shift issues in Section 8.4. This discussion relies on the Ecosystem Chapter of the annual SAFE report. The SAFE report is available to decision-makers and the public. NMFS does agree that the discussion in Section 8.4 could be enhanced by incorporating the references provided in public comment. NMFS also agrees that the DEIS should be revised to include additional discussion on the available information regarding the potential impacts of climate change on salmon and pollock. Revised sections have been appended to this CAR, and will be included in Chapters 4 and 5 of the Final EIS.

Comment 3-14: Section 3.4 fails to consider several reasonably foreseeable future actions that will have impacts on Chinook salmon in the affected region. The "Other Federal, State, and international agencies" category should include future exploration and development of onshore mineral and oil and gas resources and development of hydrokinetic power resources in river. Water quality, pollution, habitat damage caused by mining, dredging and cumulative effects of same on Chinook salmon stocks are not discussed in the DEIS. Nor are management practices that may be harmful to selected stocks (e.g. those that increase bycatch of Chinook salmon in in-river fisheries). These factors need to be identified as additional sources of potential harm to Chinook salmon runs and need to be addressed in the DEIS.

Section 3.4.4.3 states that Chinook salmon consumption can be an important part of regional diets. Chinook salmon are in fact the staple of many regional diets, and the most important subsistence food in many of the regions discussed. This statement should be modified to more accurately characterize the importance of Chinook salmon as a subsistence resource. Section 3.4.4.5 mentions increasing mining activities in Alaska in coming years. Donlin Creek mine, a proposed open-pit gold mine located between the Kuskokwim and Yukon River watersheds should be specifically mentioned in this section as is the proposed Pebble mine.

Response: NMFS agrees that additional reasonably foreseeable future actions and their impacts of Chinook salmon should be included in the Final EIS. These additional reasonably foreseeable future actions have been added to Section 3.4 and the analysis of impacts of these on Chinook salmon have been added to section 5.4, which are attached to this Comment Analysis Report in Appendix 2 and 6.

Comment 3-15: The DEIS does not discuss the cumulative impacts of the proposed action. Instead of providing a review of the associated cumulative impacts, the DEIS lists a variety of impacts with no analysis of what the actual cumulative impact is. So, while the DEIS acknowledges potential impacts in Section 3.4, there is no way to gauge the impact, taking all these different actions into account, on salmon runs. Section 3.4 does not a contain conclusion that assesses the cumulative impact of all the past, present, and reasonably foreseeable actions.

Response: Section 3.4 was not designed to assess the cumulative impacts of all the past, present, and reasonably foreseeable future actions. As explained in section 3.4, this section provides a summary description of the reasonably foreseeable future actions that may affect resource components and that also

may be affected by the alternatives in this analysis. The reasonably foreseeable future actions identified in Section 3.4 are likely to have an impact on a resource component within the action area and timeframe. These include future actions that may affect the Bering Sea pollock fishery, the salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on the resources components analyzed in the DEIS. Identification of actions likely to impact a resource component, or change the impacts of any of the alternatives, within this action's area and time frame will allow decision makers and the public to make a reasoned choice among alternatives.

In the DEIS, relevant past and present actions are identified and integrated into the impacts analysis for each resource component in Chapters 4 through 8. Each chapter also includes a section on consideration of future actions to provide the reader with an understanding of the changes in the impacts of the alternatives on each resource component when we take into account the reasonable foreseeable future actions. The discussions relevant to each resource component have been included in each chapter (1) to help each chapter stand alone as a self-contained analysis, for the convenience of the reader, and (2) as a methodological tool to ensure that the threads of each discussion for each resource component remain distinct, and do not become confused.

Public comment identified a number of reasonably foreseeable future actions that NMFS agrees should be added to Section 3.4 for the Final EIS. See response to comments 3-13, 3-14, 5-06, 5-12, 5-13, 5-14, and 5-15. NMFS has also added to the analysis of the impacts of reasonably foreseeable future actions on pollock (Section 4.4), Chinook salmon (Section 5.4), and chum salmon (Section 6.6), as requested by public comments. These revised sections are appended to this CAR.

Comments on the observer issues and the catch accounting system

Comment 3-16: It is our understanding that NMFS observers may be underreporting bycatch and that NMFS is aware of the underreporting bias but has not adequately accounted for it in the EIS.

Response: NMFS disagrees and is unaware of a deliberate underreporting bias by observers. Observers are trained by NMFS, monitored during the fishery, and debriefed extensively by NMFS staff after each deployment. The Observer Program has long standing and sophisticated quality control practices in place and regularly evaluates the quality of observer information and sampling methodology. Data which NMFS identifies as being collected incorrectly are routinely corrected, when possible, or removed from the system, and the estimation processes are re-run to account for any corrections. NMFS final catch statistics for any given year include all of the corrections made to that years observer information.

Comment 3-17: The NMFS Alaska Region relies on unverified assumptions that may lead to overly optimistic estimates of precision and systematic underestimation of bycatch. These assumptions include: 1) unobserved vessels behave the same as vessels with observers onboard; 2) observed vessels behave the same while observers are off shift; 3) salmon outside of an observer's sample on catcher processors are not included in bycatch estimates but are claimed to be delivered to observer for examination; 4) observers attempt to remove all salmon from the catch as it is offloaded at shoreside plants, but inevitably miss some (called 'after-scale' salmon in DEIS); 5) observers record 'after-scale' salmon as if the observers themselves had collected them; 6) it is not clear if 'after-scale' salmon are physically sampled by observers for coded wiretags; 7) the proportion of salmon physically examined by observers for coded-wire tags is not reported; and 8) the proportion of salmon discarded at sea is not reported.

Response: NMFS agrees that there are potential issues associated with estimation of bycatch. Response to each of the comments follows:

1 and 2) NMFS agrees that catch estimates rely on the assumption that unobserved fishing operations have similar bycatch characteristics as observed fishing operations. NMFS has not evaluated this assumption; however, NMFS is not aware of evidence of biases favoring overly optimistic estimates of precision and systematic underestimation of bycatch. This assumption associated with NMFS catch estimation is acknowledged in chapter 3 of the DEIS. Efforts to improve overall quality of observer data are ongoing within NMFS and through the Council to restructure the mode in which observers are contracted and deployed.

3) NMFS disagrees that salmon outside of an observer's sample on a catcher processor may cause biased estimates. Regulations require vessel personnel to retain salmon from all catches until they are counted by an observer, but NMFS does not use these unverified, industry sorted, numbers in management. Instead, NMFS estimates salmon bycatch by expanding the independent observer sampled salmon to unsampled portions of the catch using accepted statistical estimation techniques.

4 and 5) The commenter refers to "after-scale" salmon and this means salmon which were detected by plant personnel after the fish were weighed in a fish processing plant. NMFS agrees that some salmon may initially make it past the observer into the shoreside processing plant and improvements needed to reduce the occurrence of "after scale" salmon were addressed in the SEIS on page 106. Currently these after scale salmon are returned to the plant observer by plant personnel and they are counted in NMFS estimates of Chinook salmon bycatch.

6 and 7) The "after-scale" salmon are brought to the observer by plant personnel and these fish are included in the observer's counts. NMFS observers are trained to collect snouts from Chinook salmon which are missing an adipose fin. Observers currently collect snouts from salmon they encounter within their samples. The coded wire tag is not visible and is extracted later by NMFS staff noting that not all fish with clipped adipose fins have tags in them. In some circumstances when there are large numbers of salmon, the observer can only look at a subset of them, and this subset can be identified using the protocols NMFS had had in place since 2008. Observers also collect snouts opportunistically from adipose clipped salmon from outside of their samples. Information is collected to identify which fish were collected outside of the samples so analysts can use the information appropriately in their work.

8) NMFS disagrees that the number of at-sea discards is unknown. Vessel operators are prohibited from discarding salmon at-sea until salmon are sampled by an observer. The final estimates produced by NMFS include at-sea discards.

Comment 3-18: The DEIS notes that Chinook salmon "that are retained by catcher/processor and mothership crew outside of the observer's sample are not included in the observer's samples and are not used to estimate the total number of salmon caught." Capturing such information could provide a useful check on the accuracy of the observer estimates for the observed vessel hauls. Id. at 104. Also, in light of Miller (2005), it would seem that this information is ultimately used by the Alaska Regional Office via transmission from the fishing industry to estimate bycatch, so it is not clear why the information is not recorded by observers to serve as a check on the accuracy of the industry data.

Response: NMFS agrees that this information could be useful, however NMFS prefers to rely on scientifically trained observers as opposed to crew-member census as recorded on WPR. NMFS disagrees with the premise that this information is then used by the NMFS Alaska Region to estimate bycatch.

Comment 3-19: Explain the technique used to estimate Chinook salmon bycatch in the pollock fishery.

Response: Chapter 2.5 and 3.1.4 of the DEIS provides a detailed explanation of the estimation procedure for Chinook salmon.

Comment 3-20: If current bycatch monitoring is effective, why does NMFS advocate increasing observer coverage for catcher vessels with transferable bycatch allocations and for shoreside processors?

Response: NMFS explains in DEIS chapter 2.5, managing and monitoring alternative 2, of the DEIS that increased observer coverage on catcher vessels from status quo is required for alternatives that allocate Chinook salmon bycatch to entities. Entities that receive an allocation are prohibited from exceeding the allocation. If an entity exceeds an allocation, NOAA may initiate an enforcement action against the entity. Enforcement of a quota allocation requires entity-specific catch information. Currently, some catcher vessels under 125 feet in length are required to carry an observer on 30 percent of their fishing trips. To enforce transferable allocations, NMFS would only increase catcher vessel coverage so that all trips were observed so the bycatch estimate is entity-specific. The DEIS does not recommend increased observer coverage on catcher vessels for alternatives that do not have entity-specific allocations.

Comment 3-21: The DEIS states that the "the levels of salmon bycatch are precisely estimated. . . " pg. 103 (citing Miller (2005). The DEIS, however, fails to explain or consider several important factors in this regard. It does not appear that the bycatch numbers reported in the DEIS were estimated by the same methods presented in Miller (2005). A comparison of Chinook salmon bycatch estimates presented in Miller (2005) and in the DEIS suggests the biases introduced by the NMFS Alaska Region. Given the precision claimed by Miller (2005) for his estimates and the fact that he relies solely on sampling results, it is unlikely that such large differences could be dismissed as mere modeling differences. The DEIS must explain this discrepancy between the bycatch numbers on which it relies and those in Miller (2005).

Response: NMFS believes the estimates for bycatch used in the DEIS are based on the best available science. NMFS disagrees that the agency is using an ad hoc method for estimating bycatch. The NMFS estimates of Chinook salmon are based on well-established sampling methodology implemented by the observer program and ratio estimators based on post stratification of catch. The sampling intensity for bycatch in the pollock fishery is very high in order to reduce the severity of potential sampling issues and to satisfy the demands of inseason management. Because sampling fractions are high for the pollock fishery, uncertainty associated with the magnitude of salmon bycatch is relatively low. Fishing activities during the time period considered in the DEIS were managed under NMFS-generated catch estimates, not the estimates used by Miller (2005) in his PhD dissertation. The NMFS estimate is the official record of catch of Chinook salmon.

NMFS recognizes the differences between their estimates and those presented in Miller 2005 as part of a dissertation. To address this comment, several potential sources of error and the assumptions used by Miller in querying the database were examined. The results indicate one fundamental flaw is the way that Miller understood and used the observer data. Additionally, an assumption about the observer coverage level was made, but is no longer necessary. Neither of these issues discredit Miller's dissertation work, which represents a very comprehensive and thorough presentation of a statistically sound method. However, an unfortunate detail about how observer data records were coded for salmon specifically was overlooked. While the methodology presented in Miller is sound, the details required for proper implementation of the method include extensive sets of cross-checking about assumptions on how data are being used and how they are being interpreted. NMFS is continuing to develop a system that provides

reliable scientifically defensible estimates while at the same time meeting the needs of inseason management and transparency in how estimates are computed.

The main reason that Miller's estimates are considerably higher than NMFS is due to the fact that partial and whole-haul samples with no Chinook salmon were inadvertently excluded in his estimation. Prior to 2008, the observer program had a data convention that if a sample was taken and no salmon were found, then a default species code (220) was used and a zero for the number of salmon in the sample was recorded. These specimen records were inadvertently overlooked. If salmon species other than Chinook salmon were found in the bycatch, then those species codes were recorded and the partial or whole-haul record created for that species. Those records (positive records of non-Chinook salmon) were also omitted from the algorithm. Since in both of these cases the samples represent effort that should be included as part of the Chinook sampling, the unintentional omission of those samples is clearly incorrect and results in significant overestimates. Observer data collection system revisions implemented in 2008 eliminated this potential for confusion by eliminating different sample sizes for different species within a haul.

A second, relatively minor issue is that Miller's design and model-based estimators assume that the observer coverage for 60-125' vessels was exactly 30% for all trips within each quarter of the calendar year. In reality, these vessels often have a much higher levels of coverage based on trips (sometimes in excess of 50%) and therefore this assumption may lead to estimates that are biased (depending on the real level of observer coverage). One simple solution is to use the true ratio of observed and unobserved trips or fishing days for each year and quarter and this was noted in his study but at the time, the information was unavailable.

In summary, the discrepancy in point estimates between Miller and NMFS estimates are due to some incorrect data interpretations from Miller and is not due to differences in estimation methods. Edits to clarify the differences between these methods will be included in the DEIS.

Comment 3-22: Observers should be collecting fin clips from Chinook bycatch as part of a long term scientific genetic sampling program designed to represent, annually, the genetic contributions of the salmon bycatch. In-season stock identification techniques are available and should be used. This is especially important as listed ESA stocks are taken as bycatch (p,244). In addition, coded-wire-tag data should be evaluated against genetic estimated to access concordance.

Response: The majority of salmon bycatch in the Bering Sea groundfish fisheries is in the pollock fishery for which a large fraction of the fishing operations (~70%) are sampled by observers. In fact, since 2003 the average *sample fraction* of the total pollock catch from observed vessels exceeds 50% (although this does vary by sector). This level of sampling effort is unprecedented. The current level of observer coverage provides sufficient data and confidence in the catch data to allow for sustainable management of the fishery and to give some understanding of the bycatch in the fishery.

The AFSC North Pacific Observer Program (NPGOP) has collected salmon tissue for genetic analysis at the request of AFSC Auke Bay Lab staff in support of a developing genetics program. The salmon tissues were initially collected in an ad hoc manner to support a pilot project. In 2009, AFSC staff collaborated to make changes in the tissue collections by moving from ad hoc collections to selecting the tissues from salmon encountered in the existing sample frame used by observers for catch composition sampling. The changes made in 2009 provide more tissue samples for analysis, but further refinements to the sampling protocols may be required in the future before stock composition estimates representative of the entire bycatch can be completed. NMFS may make further modifications to observer tissue sampling as we evaluate these samples and further refine our work. NMFS is committed to continuing to obtain

tissues to enable a better genetic understanding of the origin of salmon taken as bycatch. Given substantial additional financial resources and a sampling plan designed for the purpose, seasonal estimates of the stock composition of the samples would be possible.

In-season (near real time) analyses are not presently feasible due to the large numbers of observers collecting samples and the non-uniform times at which they return to port to ship the samples. The analysis of samples taken may occur months to years after the samples were collected, dependent on available funding for the laboratory analysis for either CWTs or genetics. It is important to determine the origin of salmon in the pollock fishery bycatch to understand the potential effects of bycatch on ESA-listed salmon stocks. The incidental take statement of ESA-listed salmon is based on annual determinations of salmon bycatch and CWT recoveries and is not based on an inseason determination. CWT recoveries and genetic analysis of salmon bycatch are both described in the annual report on salmon bycatch to the NW Region, as required by the terms and conditions in the 2007 supplement to the 2000 biological opinion on the effects of the Alaska groundfish fisheries on ESA-listed salmon. At this time, only the CWT recoveries provide direct evidence of bycatch of ESA-listed stocks while genetic analysis provides origin of the salmon on only a regional level.

Scientific challenges surround the ability to genetically detect ESA-listed salmon stocks in the bycatch. Detection or identification of ESA-listed stocks depends in large part on sufficient numbers of samples from the bycatch and the power of the genetic markers to separate stocks. Individuals from ESA-listed stocks are expected to be rare in the bycatch of federal fisheries in the Bering Sea, based on CWT recoveries from salmon sampled by the observer program and from research cruises. If the number of individuals from the ESA-listed salmon stocks is small relative to all stocks contributing to the bycatch mixture, the probability of detecting the presence of the ESA-listed stock may be quite small, even with a relatively large sample from the salmon bycatch.

Comment 3-23: How effective is the quality control on observer data? Explain the nature and amount of corrections and the nature of any data entry problems.

Response: NMFS believes that this comment is outside the scope of the DEIS since the alternatives considered in the analysis do not require changes to quality control and data entry procedures for observer data. For reference, the observer protocols for data collection are documented in observer sampling manual (http://www.afsc.noaa.gov/FMA/Manual_pages/MANUAL_pdfs/manual2009.pdf) and a description of data quality is documented in the North Pacific Groundfish Overview (http://www.afsc.noaa.gov/FMA/PDF_DOCS/NPGOP%20REPORT%20-%20Overview%202001%20-%20web.pdf).

Comment 3-24: The average bycatch (pg. 244) of 49,600 Chinook salmon does not include unreported bycatch by vessels without observers or chum salmon.

Response: NMFS provides estimates of all bycatch including chum and for vessels without observers. Chapter 3.1 explains how NMFS estimates Chinook salmon bycatch by expanding observer data to unobserved fishing operations.

Chapter 4 comments

Comment 4-1: The lowering of the pollock TAC to 815,000 tons will help to alleviate bycatch but it is not enough. Scientific evidence presented at the December 2009 Council meeting, that indicated that the pollock TAC should be 400,000 tons, was ignored.

Response: NMFS disagrees with this comment. While a lower pollock TAC might result in lower bycatch amounts of salmon (assuming similar salmon bycatch rates per metric ton of pollock), there was no scientific information presented in December 2009 to indicate the pollock TAC should be set to 400,000 metric tons. Scientific information presented at the December 2009 Council meeting, using the latest stock assessment information from the Alaska Fisheries Science Center, reviewed by scientists from the Groundfish Plan Teams and the Council's Scientific and Statistical Committee, indicated a conservative acceptable biological catch (ABC) limit of 815,000 metric tons.

Comment 4-2: As the pollock abundance continues to decline, fishing effort will increase resulting in additional salmon bycatch. Review the pollock quota and consider season reductions to protect the pollock stocks. As the desired commercial fish stock becomes less abundant, more fishing effort follows, which results in additional salmon bycatch.

Response: NMFS disagrees. Pollock abundance is projected to increase, from its current levels. In the event abundance did continue to decline, fishing effort is likely to decrease correspondingly. While it is possible that catch per unit effort would decrease (thereby resulting in increased effort relative to a given stock abundance), it is not accurate to assume that overall effort would increase. If seasons were shortened, effort to catch the TAC (at whatever level) would simply be compressed into a shorter time frame. It is possible that season restrictions could be effective at reducing salmon bycatch, if seasons were closed during certain periods of higher bycatch rates, but overall effort would not necessarily be decreased. Shortening the pollock season, or closing it during certain periods of higher salmon bycatch rates, is discussed in section 2.6, Alternatives considered and eliminated from further analysis on page 100. The Council and NMFS could consider such season adjustments through a separate plan amendment analysis, but not as part of the action covered under this EIS.

Comment 4-3: The Final EIS should include a discussion of how climate change may have a direct, indirect, and/or cumulative impact on the Bering Sea pollock fishery and the management decisions for the Chinook salmon bycatch management. The Final EIS should discuss adaptive management measures that would be taken to address climate change conditions. Additional information exists regarding how pollock abundance and distribution may change as a result of climate change. These changes could have a profound effect on salmon bycatch in the pollock fishery. For instance, if pollock abundance continues to decrease or stocks become more erratically distributed it could increase towing times which would correlate with higher overall salmon bycatch. A number of peer-reviewed scholarly articles investigating climate change effects on pollock and other gadids with similar life histories may be found in the Proceedings of the Symposium Resiliency of Gadid Stocks to Fishing and Climate Change, 2007. G.H. Kruse, K. Drinkwater, eds. Alaska Sea Grant, Anchorage, Alaska.

Response: Additional information on climate change and impacts to salmon and pollock productivity will be included in the Final EIS. See response to comment 5-14. Revised sections are appended to this CAR which include further information on this topic. Note that while a general discussion of climate

change impacts can be included in the document, it is not possible to definitively estimate impacts on pollock or Chinook salmon stocks.

Comment 4-4: The DEIS overlooks the potential cumulative impacts of foreign fisheries on transboundary stocks of pollock. Russian fishery managers project increased effort and catch in all pollock fisheries from the Sea of Okhotsk to the Western Bering Sea. Two separate investigations of the Eastern Bering Sea pollock stock estimated that 10-30% of the U.S. stock spills over into Russian waters.

Response: NMFS acknowledges this comment. However, the focus of this DEIS, and potential action being considered, is Chinook salmon bycatch caps on the U.S. pollock fisheries. The cumulative effects of foreign fisheries on transboundary pollock stocks is of interest in the determination of annual catch limits on U.S. pollock fisheries, and these affects are taken into consideration in the determination of those catch limits on an annual basis.

Chapter 5 Comments

Comments containing run information

Comment 5-1: Management and conservation of Yukon River salmon are challenging during these times of reduced salmon production when restrictions to subsistence fisheries may be necessary. 2008 was a very poor Chinook salmon fishing season on the Yukon River. The Canadian Chinook salmon escapement objective was not met for the second year in a row. Fisheries managers closed commercial fishing in the US and Canada. They reduced fishing time in the U.S. subsistence fisheries and allowed only smaller mesh gillnets in the lower Yukon River districts. Managers reduced sport fishing bag limits in the U.S. and closed sport fishing in Canada. Canadian First Nations voluntarily reduced aboriginal fishing harvests by more than 50 percent. Even with these severe reductions, spawning escapement of Canadian-origin Chinook was 27 percent below the minimum interim management escapement goal of 45,000 Chinook salmon. A poor run of Yukon River Chinook salmon is anticipated in 2009. Returns in Bristol Bay are also down.

Response: NMFS acknowledges this comment. Updated run and harvest information, to the extent the information is available, will included in the Final EIS.

Comment 5-2: In 2008, 150,000 Chinook salmon were counted entering the Yukon River while 122,000 Chinook salmon were caught as bycatch in the BSAI pollock fishery. These bycatch estimates only include the December fishing season and no bycatch was recorded for this fishery during the earlier fishing season. All of the bycatch Chinook salmon were bound for Western Alaskan Rivers but only a small portion reached the Canadian border. Escapement was also low on the Tanana River, Ankreafsky River, and other tributaries to the Yukon River due to bycatch in the BSAI pollock fishery.

Response: NMFS acknowledges this comment. Updated run information as well as estimated stock composition proportions of the pollock bycatch of Chinook salmon are included in the DEIS. The degree to which bycatch relates to declining Yukon River salmon stocks is unknown.

Comments on ichthyophonus

Comment 5-3: The DEIS fails to consider the effect of ichthyophonus, an infection that can render fish unusable, on the availability of fish for subsistence harvest. Of the 762 pages in the DEIS, exactly 21 lines are devoted to ichthyophonus infection and none of this rather abbreviated text discusses the impact of the disease on subsistence. DEIS at 228. The DEIS does cite ADF&G statistics that the ichthyophonus infection rate on the Yukon River averaged 20%, 2004-2007. DEIS at 228. However, the DEIS also cites a study by Dr. Richard Kocan as providing the "baseline" analysis of the extent to which the disease is present in Yukon River Chinook salmon. Id. After admitting the Kocan study establishes the baseline, the DEIS neglects to mention that the "baseline" showed the infection rate had already reached "about 45%" in the Yukon River by 2003. Kocan, R., P. Hershberger, J. Winton; Ichthyophoniasis: An Emerging Disease of Chinook Salmon in the Yukon River; Journal of Aquatic Animal Health, 2004 ("Kocan 2004") at 58. The DEIS also cites Hayes, et al. 2006 as documenting the ichthyophonus infection rate on the Chena River, but fails to mention that this study showed a 37% infection rate. DEIS at 228. The DEIS also neglects to mention that the Kocan study reports ichthyophonus is "firmly established" in the Yukon River, "increasing to levels that impact subsistence and commercial fishing, as well as the resource itself."

Kocan 2004 at 68. In that regard, the DEIS fails to mention that middle Yukon River fish processors are discarding up to 20% of purchased fish because of tissue damage caused by ichthyophonus. Id. at 58.

Response: Ichthyophonous is described in the DEIS in section 5.2.4.3 page 228. Additional details could be included in this section as well as noted in the subsistence section to more comprehensively describe the disease in the Final EIS, but an estimate of the impact on harvests due to ichthyophonous is beyond the scope of this analysis.

Comment 5-4: The DEIS does not discuss whether or not such fish lost to ichthyophonus are adequately accounted for in the annual salmon catch accounting system, but the disease is clearly a problem for subsistence fishermen.

Response: The DEIS provides some information on ichthyophonus in section 5.2.4.3 page 228. No information on presence of the disease is recorded by NMFS observers and no additional information on the disease presence or absence in bycaught Chinook salmon in the federal fisheries is available from NMFS.

Comment 5-5: Ichthyophonus has several potential implications for the issues discussed in DElS. First, there are reproductive issues associated with disease-related mortality and/or failure of infected fish to reach the spawning grounds in a sufficiently good enough condition to successfully spawn, in other words, what the infestation does to the salmon runs themselves. Second, there is the effect that the disease has on subsistence fishermen who are compelled to inspect their catch and then throwaway infected fish. For every such fish they discard, they must return to the stream to catch another.

The ichthyophonus effect is not even mentioned in the DEIS as a factor for consideration in connection with the subsistence fishery. Instead, the DEIS focuses entirely on Chinook bycatch in the pollock fishery as the sale explanation for the extra time and expense that, according to the DEIS, Yukon fishermen have been reporting in connection with their efforts to meet subsistence needs.

The DEIS'S failure to disclose, much less discuss, the complications that the Ichthyophonus infestation is having on in-river Chinook stocks and on the fishermen who depend on those stocks for subsistence purposes is a major flaw in the analysis. The disease is clearly a complication insofar the development and maintenance of a commercial fishery for Chinook well. Again, the DEIS is silent on the issue. The Council and the public deserve to be fully informed about all such other causal factors when making their decisions about whether or not and to what extent bycatch in the pollock fishery may be contributing to the problems being faced by up-river fishermen and what to do about it. The DEIS fails to meet that test insofar as its cursory discussion of Ichthyophonus is concerned.

Response: Additional information on ichthyophonous is not necessary in order to understand the impacts of the Council's forthcoming management decision. A discussion of ichthyophonous is included in the DEIS in section 5.2.4.3 on page 228. The relationship of ichythyophonous to in-river returns is certainly a consideration for ADF&G managers, however treatment of and analysis of the impacts of the disease is outside the scope of this analysis.

Comments on impacts to Chinook salmon

Comment 5-6: The DEIS fails to provide decision makers with the necessary refinement showing, for example, the relative impact of a bycatch salmon cap of 68,000 versus 47,000. This difference of 21,000 fish would result in an AEQ of returning fish of only 17,640. However, since only 54% of the Chinook salmon taken in the pollock fishery originates in western Alaska, the total difference to all of western Alaska would be 9,526 fish. An addition of only 9,526 fish throughout western Alaska is a minuscule number when one considers the actual percentages that would be available for escapement by the river system, let alone for subsistence and other uses. The DEIS does none of this analysis.

Response: NMFS disagrees. The values cited are drawn directly from the analysis and these are valuable for decision considerations. Carrying the results further and making an assertion about relative impacts would require a number of inappropriate assumptions about in-river management and stock productivity.

Background

Impact rates had been presented in the preliminary draft for public review as part of the evaluation of using indexed (annually varying) caps as an alternative. Information was presented as an example of the process by which a threshold impact rate policy, indexed to a specific stock (or stock grouping), could be used to establish a cap level (e.g., of not more than X% impact rate on Y river system). A specific example in the preliminary draft involved comparing Coastal W AK estimates of run sizes with AEQ levels. This information was not included as a representation of the relative impact of bycatch rates or thresholds on the river systems themselves due to incomplete understanding of the impact of bycatch on stock productivity. Rather it was included as a means to provide a policy-basis for the cap in terms of freezing or decreasing relative impact rates. Because estimates were unavailable for some river systems, and because it would be difficult to select the stock from which to index the cap, the Council decided to drop consideration of a cap indexed to a specific impact rate threshold by river system, as discussed in the DEIS in Section 2.6). As the information was only presented in the context of formulating a policy-based cap, impact rate information was not included in the DEIS to reduce the possibility of mis-characterizing impacts.

Use of fine-scale AEQ and run-size results

At finer scales (i.e., specific river systems), the data become increasingly uncertain for both AEQ estimation and for run sizes. For AEQ estimation, some critical assumptions include

1. that the genetics results within season and areas are constant;
2. that the sample period (2005-2007) is suitable for earlier periods;
3. that a weighted average age-specific maturation by brood year is adequate; and
4. that oceanic survival rates are reasonable and similar for different river systems.

For these reasons, a full assessment of this level of uncertainty is incomplete. The DEIS carries forth AEQ estimation uncertainty to the extent possible, but given some of the critical assumptions as noted above, these uncertainty estimates are too low and consequently may be misleading. Hence, NMFS believes it is inappropriate to present fine-scale point estimates.

Use of total run-size estimates for impact analyses by river system or in aggregate are also problematic. As described in the DEIS, assessment of total run size and escapement by river system is variable between systems. Some river systems in the WAK region lack total run or escapement estimates. As

such, combining available estimates to determine an "aggregate total" for WAK is inappropriate due to magnification of errors. Also, combining harvest and escapement data independently to reconstruct runs (as with the NRC report "Effects of Chinook salmon bycatch in the Bering Sea pollock on salmon harvest, escapement, and abundance in Western Alaska (Ruggerone 2009), attached to the comment letter number c39 from Nossaman LLP) tends to mask the uncertainties and data limitations. Use of individual run estimates to compare with bycatch AEQ is also complicated by the caveats associated with the stock composition estimates. AEQ estimation to river of origin was used in the DEIS to estimate the relative changes under various cap scenarios. These estimates are also uncertain and that uncertainty increases with further extrapolations historically and to finer resolutions. Therefore, judgments with respect to detailed impacts were avoided, especially in cases where it would require interpretations beyond the extent of the data. Finally, impact rates by river system (i.e., explicit comparison of AEQ with run size for runs) would presume analyses on productivity thresholds about river systems that are beyond the scope of this analysis.

Even if it were appropriate to include data for specific river systems, this information is insufficient for determining whether there is a conservation concern. NMFS considers the EIS adequate for making reasoned decisions and has presented data in a fair manner while attempting to minimize judgments on Chinook salmon management and productivity levels.

Summary

Estimates of impact rates as a metric for evaluating conservation issues of concern were discussed. Given the paucity of information to evaluate the relative impact of bycatch on specific river systems for explicit decision-making, and due to uncertainties related to the river-specific AEQ analysis, a comparison of AEQ values relative to run sizes was omitted.

Comment 5-7: The analysis of impacts on Chinook salmon is limited to the gross estimated number of bycatch salmon that are reported by the fishery. Other factors that must be evaluated include:

1) impacts on salmon that are contacted, but not retained, by the net or associated gear;
2) data collection issues explained above which may bias estimates of the total number of salmon downward and which may bias estimates of the number of ESA-listed salmon downward;
3) impacts to Chinook salmon stocks in other regions besides Western Alaska;
4) impacts on salmon schools or schooling behavior;
5) cumulative effects of persistent trawl mortality on salmon populations;
6) effects of non-selective mortality on Chinook salmon populations as the Chinook salmon taken by trawls may not be the same ones that would succumb to disease, predation, or other causes of natural mortality;
7) interactions and cumulative effects from other fisheries, especially the Russian pollock fishery, which almost certainly intercepts significant numbers of Chinook salmon; and
8) attractive nuisance impacts associated with the effects of offal discharge from the mothership and catcher/processor vessels that lure Chinook salmon to the vicinity of these vessels during wintertime operations when the availability of alternative food sources is low, thereby increasing the likelihood attracted Chinook will be caught by subsequent trawling.

Response: The analysis of impacts on Chinook salmon are based on the best available scientific information regarding the action and Chinook salmon. Responses are specific to the numbered comments above.

1) Without specific studies to determine the effects of contacting the salmon by trawl gear, it is not possible to determine the impacts on salmon and address this in the EIS. It is likely the contact with the salmon by fishing gear may result in injury, but the impact on the mortality of the salmon is not known and cannot be analyzed without more information.

2) The pollock fishery is well sampled for bycatch resulting in highly confident estimation of salmon bycatch. Because of extrapolation of subsamples to the whole haul at times of high catch, the likelihood of over and under estimating the bycatch is about the same. The number of ESA-listed salmon taken is based on the coded-wire tag (CWT) recoveries and the estimated contribution of the tagged population. Recoveries of the tags are based not only on the normal observer samples but also on the occasional salmon that may not have been part of the observer's sample but noticed to have a clipped fin by crew and delivered to the observer by the crew. Therefore, the ESA-listed salmon numbers are based not only on the observer sampling but also on the opportunistic collection of additional CWTs, outside the normal observer sampling process.

3) The DEIS discusses not only the effects on salmon bycatch on western Alaska stocks but also on ESA-listed stocks, Pacific Northwest, Cook Inlet, and Russian stocks. This information is included in Chapter 5, Tables 5-47 through 5-51, and page 302-303.

4) Without specific studies to determine the effects of trawling on salmon schools and schooling behavior, it is not possible to determine these kinds of impacts on salmon and address this in the EIS.

5) The effects of continued trawling on salmon is inherent in the analysis provided in the EIS. The action is expected to continue into the future and the effects on salmon are described expecting the fishery to be implemented for the long term.

6) It is not possible to tease out the salmon that may have been taken by different causes of natural mortality versus salmon affected by trawling. No information is available to determine the selectivity of the condition of salmon taken in trawling vs the condition of salmon that would die of natural mortality (e.g. are healthy salmon more likely to be taken in a trawl)

7) DEIS contains a discussion of other fisheries that may be most likely to have an impact on salmon resources in sections 3.4.3 and 3.4.4. The Russian pollock fishery is not discussed because no information on salmon bycatch in this fishery is available to allow for an analysis of potential effect.

8) Recent information from the BASIS survey indicates that Chinook salmon may be eating offal in the winter possibly due to starvation (45 % of stomachs from winter sampling were empty), available at: http://www.npafc.org/new/events/symposium/BASIS%202008/Abstracts/Poster-19(Davis). It is not known whether Chinook salmon feeding on offal are also more likely to be taken in trawls compared to Chinook salmon that eat primarily squid, the usual winter prey. It is possible that the Chinook salmon are provided an easy source of food from the offal discharge which may be a beneficial effect, but it may also be a detrimental effect if the salmon are more likely to be taken in a trawl when feeding on offal. Without more information, it is not possible to determine the potential effect of offal discharge on Chinook salmon and if there is a nuisance effect.

Comment 5-8: Due to the presence of ESA-listed Chinook salmon stocks taken in the BSAI pollock bycatch, a comprehensive research and monitoring program, including both Alaskan and lower-48 streams, is necessary. This research and monitoring program must be based on sound science and full public participation and disclosure. To complete such an evaluation, the DEIS and NMFS should have

more complete biological information about age and stock of origin. If it is technically impossible to separate ESA and transboundary stocks with genetics or other means, the Final EIS must describe the reasons.

Response: The DEIS uses the best available information on the organ of salmon based on genetic research and provides the most complete description of the stocks possible based on this information. NMFS agrees that additional analysis is needed to better understand the potential effects on salmon bycatch on salmon stocks. That is why we are working with other organizations and universities to conduct genetic research on salmon bycatch from the Bering Sea pollock fishery, and we continue to be a participant in the Pacific coast wide coded wire tag (CWT) program which provides public access to all coded wire tag activities throughout the Pacific region at http://www.rmpc.org/. Genetic research on salmon bycatch from the pollock fishery is ongoing and is expected to provide more information on the origin of salmon taken in the pollock fishery, including information on ESA-listed salmon stocks. The CWT recoveries from salmon taken in the pollock fishery give stream origin specific information. The CWT program includes transboundary and ESA-listed salmon stocks from streams and hatcheries coastwide along the US and Canada Pacific. Based on the review of all ESA-listed salmon stocks in the 2007 supplement to the 2000 biological opinion on the effects of the Alaska Groundfish fisheries on ESA-listed salmon, only the Lower Columbia River and Upper Willamette River Evolutionary Significant Units (ESUs) ESA-listed Chinook salmon stocks are caught in the BSAI pollock fishery.

NMFS agrees that ESA Section 7 consultation will be required before implementation of the Bering Sea pollock fishery salmon bycatch reduction program. The best available scientific and commercial information will be used at the time of the consultation to understand the potential impacts of the action on ESA-listed salmon. We do not know at this time if the consultation will result in a new biological opinion. The incidental take statement in the 2007 supplement to the 2000 biological opinion provides for a range of recent observations of the incidental catch of salmon in the BSAI groundfish fisheries and of CWT recoveries. The incidental take statement states that based on data since 2001, Chinook salmon bycatch ranged from 36,000 to 87,500 fish, and the CWT recoveries ranged from 0 to 24 fish per year for the Lower Columbia and Upper Willamette rivers ESUs. The number of Chinook salmon incidentally taken has increased the past few years, but the number of CWT recoveries from ESA-listed stocks has not changed. Even with the large amounts of bycatch in 2006 and 2007, no CWTs were recovered from ESA-listed Chinook salmon stocks since 2006. The CWT recoveries provide direct evidence of the take of ESA-listed salmon. We continue to monitor the amount of Chinook salmon incidental catch in the Alaska fisheries and provide annual reports to the NMFS Northwest Region, as required by the 2007 supplement to the 2000 biological opinion.

Comment 5-9: The current Chinook salmon genetic analysis and the adult savings calculations were based on an insufficient number of opportunistically collected samples which inadequately represent stock contributions being harvested by the BSAI pollock fishery. The bias in these data could confound the AEQ and not accurately represent the stock composition of Chinook salmon bycatch harvested by the pollock fishery. The likely inadequacy of the existing samples to represent the entire bycatch seriously undermines the apparent conclusion that few Yukon River Chinook salmon occur in the bycatch.

This appears to be substantiated by Tables 5-47 to 5-51 on pages 297-301. These tables purport to show the adult reductions in equivalent numbers under various scenarios. Using the last row of Table 5-51, as an example, the bycatch for Chinook salmon bound for western coastal Alaska (column 3) would be reduced by 37,492. However, the bycatch reduction to the middle and upper Yukon (columns 5 and 9) would only be reduced by 449 and 389, respectively. This appears to be at odds with our general understanding of run magnitudes in Western Alaska, considering that the Yukon run tends to be the

largest in western Alaska and that the middle and upper Yukon stocks typically comprise greater than 75% of the Yukon run in most years. For example, if the Yukon run was of average magnitude of 250,000 and 75% were middle or upper Yukon origin, this would mean that the western coastal abundance of Chinook salmon would be nearly 8.4 million, which seems exceptionally high. While we realize the stock composition estimates being used are the only ones available, that does not mean they are representative of the entire bycatch. Certainly, the samples were not collected for the purpose of supporting an analysis of such broad scope.

Samples were taken on an EFP only and likely do not represent fleetwide bycatch patterns.

Response: NMFS disagrees. A revised section 3.3 is attached to this report to further clarify the methodology employed in this analysis. For further information on the use of the SNP analysis as the primary determinant of stock of origin please see the response to Comment 3-5 where an explanation of the rationale for the most recent data is provided as well as further details on the use of Myers et al. (2003) in this analysis. With respect to the apparent bias in sample collections, this is fully acknowledged and accounted for in this analysis (as opposed to a possible similar bias in Myers et al. study). Furthermore the 2007 A season data was downweighted considerably in its relative use compared to the other seasonal data due to these issues with sampling intensity. Further information has been added to section 3.3 regarding the weighting of each season as this was inadvertently omitted in the DEIS.

With respect to the proportion of middle and upper Yukon stocks, these are resolved genetically (as opposed to scale pattern analyses which fail to break out estimated proportions of the Yukon River). As noted in the DEIS, bycatch is accounted for by season and location which exerts an impact on the relative contribution of bycatch from different salmon regions, e.g., upper Yukon as presented in Figure 3-7 of the DEIS. Nonetheless, we chose to aggregate results for upper and middle Yukon with the Coastal WAK grouping (see revised Section 3.3 in Appendix 1, for more discussion of this) and characterize our results for the Yukon River as a whole system. Neither scale pattern analyses Myers et al. (2003) nor Myers and Rogers (1988) provided estimates on the relative percent contribution of the upper and middle Yukon stocks in the bycatch. Thus information on the effect of sampling variability versus actual stock composition variability in the bycatch is lacking. Stock composition estimates as presented do provide some indication of relative impacts by area and river systems using available data.

Regarding the comment about how (for example) Table 5-51 appears to be at odds a general understanding of run magnitudes in Western Alaska, it is important to understand that the bycatch composition may be out of proportion to relative run strengths, particularly by season and area strata. The AEQ estimates based on hypothetical past scenarios result in re-allocating bycatch among these strata so that relative stock composition of the bycatch can change by scenario.

Comment 5-10: The DEIS should provide more salmon species composition information and obtain stock of origin information to better understand how Norton Sound's salmon stocks interplay in the Chinook salmon bycatch. The DEIS does not characterize any Norton Sound salmon savings component.

Response: All salmon caught in groundfish fisheries are identified by observers to species level.

The ability to indicate impacts of bycatch to region of origin is dependant upon the genetic ability to resolve individual stocks. Stock of origin information for Norton Sound is currently limited by the genetic resolution for those stocks. This is described in section 3.3.2 page 117. The genetic stock identification (GSI) study employed a classification criteria whereby the accuracy of resolution to region-of-origin must be greater than or equal to 90%. Under this criteria, the Norton Sound stocks are reported

in the aggregate Coastal west Alaska stock unit. As the resolution gets finer with each reporting of the expanding data set, further resolving of the individual components of Coastal Western Alaska group is planned. However, at this time it is not known whether or not the accuracy of resolution for those Norton Sound stocks will allow for them to be resolved separately.

Impacts to Norton Sound are thus characterized in terms of trends consistent with the aggregate Coastal western Alaska stock grouping. For further information on the limitations of our ability to estimate impacts of bycatch as it relates to the overall sustainability of individual or aggregate salmon runs please see comment 5-6.

Comment 5-11: The EIS does not contain adequate information about Norton Sound Chinook salmon and this lack of information must be provided for NMFS and the Council to make an informed decision about the appropriate way to manage Chinook salmon bycatch in the BS pollock fishery.

- NMFS and the Council must make decisions that reflect the broad range of knowledge we now have concerning salmon in Norton Sound and Nome. The EIS says (on page 205) that there is only one escapement project operating specifically for Chinook enumeration in Norton Sound. There are four fish counting projects in the Nome area that count Chinook salmon. These projects count all salmon species, so they are counting Chinook.
- The EIS must include a broader range of scientific knowledge (information) about Norton Sound Chinook.
- The EIS has a limited number of references about Norton Sound Chinook salmon and must make meaningful efforts to portray a broader array of information about Norton Sound Chinook salmon so that the Council will make an appropriate action.

Response: Where sufficient information exists, we have attempted to provide overviews of the primary data which is employed in each region in assessing stock status. The other projects listed do enumerate all salmon species but are not used for primary assessment information for Norton Sound Chinook. Information provided in the EIS attempts to summarize stock assessment and stock status by region. This provides the Council with information on run status as background information to consider in assessing the vulnerability of salmon stocks. Some of the summary information for Norton Sound stocks (as reflected in Table ES-8 and Table 5-3) incorrectly listed information about the 2008 preliminary run forecast as NA when this should have been characterized as "below". Likewise the Norton Sound escapement goals summary in those tables should be changed from "infrequent" to "No". A revised version of this table is attached and will be reflected in the final EIS. The ability to indicate impacts of bycatch to region of origin is dependant upon the genetic ability to resolve individual stocks (see comment response for 5-14 regarding genetic limitations for Norton Sound). Impacts to Norton Sound are thus characterized in terms of trends consistent with the aggregate Coastal western Alaska stock grouping.

Comment 5-12: The DEIS fails to clearly identify the wide array of factors likely impacting Western Alaska Chinook runs and the ranking of bycatch in the pollock fishery among those factors and impacts. Such analysis is necessary to avoid unfounded assumptions about the need for drastic measures aimed at bycatch reduction (that could have enormous negative impacts on the pollock fishery) and unrealistic expectations about potential benefits to Chinook stocks. The Chinook salmon returns to western Alaska are highly variable and unpredictable. Bycatch of Chinook and other salmon in the pollock fishery is also highly variable and unpredictable. While much is not known, Council actions, particularly those that may bring enormous negative economic impacts, must be based on the best available information of all factors that may be at play and a realistic analysis of likely costs and benefits.

Section 5.4 contains no detailed information or conclusions about what the cumulative impact is for Chinook salmon. The DEIS must analyze what those impacts, in total, mean to the salmon runs and how those action further exacerbate or contribute to the bycatch problem.

Response: The DEIS does include a discussion of other factors that may impact western Alaska Chinook runs, in Sections 3.4 and 5.4. The FEIS will augment the discussion in these sections, in response to comments from the public, and revised sections are appended to this CAR. At the same time, it is not possible to conduct a cost and benefit analysis of the various factors impacting Chinook salmon at this time, because insufficient information is available to determine the proportionate impact each factor may have on Chinook salmon runs. Consequently, the revised sections include a broader cumulative discussion of the various factors impacts Chinook, but they do not attempt to rank these factors against Chinook bycatch in the pollock fishery.

Comment 5-13: The DEIS overlooks the potential cumulative impacts of foreign fisheries on transboundary stocks of salmon. We currently do not know the level at which salmon bycatch occurs in the Russian pollock fishery and Russian authorities are unwilling or unable to share information on salmon bycatch at this time. Despite Russian official's claims that no salmon bycatch exists in their fishery, it can reasonably be inferred from existing bycatch rates in the U.S. fishery and the absence of any kind of bycatch mitigation scheme in Russian waters that substantial bycatch in the Russian fishery goes unobserved and/or unreported. Additionally, recent news regarding Russian and Japanese driftnet fisheries in the Western North Pacific indicates that some salmon bound for U.S. waters are intercepted in those fisheries. Recently, Russian authorities began to take action to exclude Japanese fishermen from participation in the driftnet fishery that occurs in the Russian EEZ. The Japanese fishermen involved in this fishery have indicated intentions of potentially withdrawing from the North Pacific Anadromous Fish Commission process and re-engaging in the high seas driftnet fishery. The lack of information in these two important fisheries and the high degree of potential impact argues for additional precaution in addressing salmon bycatch in U.S. waters. Therefore the DEIS should estimate potential catch and bycatch in foreign fisheries in an effort to inform our own managers and the public of the level of precaution that may be necessary in our own fisheries to ensure that U.S. salmon runs ate maintained.

Response: NMFS acknowledges that bycatch in foreign fisheries can affect salmon stocks that originate in western Alaska. At the same time, it is not possible to estimate the degree to which bycatch in foreign fisheries affects western Alaska stocks. This analysis addresses management measures within the BSAI FMP region and the EBS pollock fishery only, and an evaluation of foreign catch is outside of the scope of this analysis.

Comment 5-14: To better inform managers and the public about the issues associated with climate change impacts, the Draft E1S should include the best available scientific information regarding climate change effects on salmon. A growing volume of recent research specifically addresses the issue of climate change impacts on salmonids.

Response: NMFS agrees and acknowledges that additional information on climate change and the potential impacts on salmon should be included in the Final EIS. Specific information has been added to Section 3.4, and to the analysis of the impacts of reasonably foreseeable future actions on Chinook salmon (Section 5.4), and chum salmon (Section 6.6), as requested by public comments. These revised sections are appended to this CAR. However, the impacts of climate change on salmon stocks are unpredictable, and the analysis does not attempt to draw definitive conclusions about the impacts of future climate change on salmon stocks.

Comment 5-15: Additional sources of potential harm to Chinook salmon runs need to be addressed in the DEIS. Water quality, pollution, habitat damage caused by mining, dredging, and cumulative effects of same on Chinook stocks are not discussed in the DEIS. Nor are management practices that may be harmful to selected stocks (e.g. those that increase bycatch of Chinook in in-river fisheries).

Response: Additional information on mining and dredging activities and in-river and ocean hydrokinetic power generation has been included in the revised Section 3.4. A discussion of these impacts relative to Chinook stocks is included in the revised Section 5.4. An acknowledgement of the impact of in-river management practices on Chinook salmon stocks is included in the revised Section 5.4. These revised sections are appended to this CAR reflecting changes to the cumulative effects discussions and will also be included in the Final EIS.

General comments

Comment 5-16: The DEIS states, "Relative impacts to individual river systems are highly dependent upon where the fleet fished in a given year, as a river system's proportional contribution to bycatch varies spatially." (pg 155). This statement calls into question the premise of the retrospective analysis used to predict impacts. Since fishing locations may change in future years, the impact results from past history may not be indicative of future impacts.

Response: NMFS agrees but notes that the retrospective component takes into account the location and season that historical bycatch occurred. Stock composition of future Chinook salmon bycatch is also acknowledged to be impacted by when and where bycatch occurs from year to year.

Comment 5-17: More research regarding the origin of Chinook salmon taken as bycatch, in the Bering Sea pollock fishery as well rivers of origin, should be addressed, and the overall abundance figures of the salmon resource in the Bering Sea need to be better understood before restrictive hard caps or other measures are put in place.

Response: NMFS disagrees. While research is continuing to better understand the stock of origin and abundance of salmon species in the Bering Sea, management actions can be taken now which work toward minimizing salmon bycatch. As new information unfolds, the Council may choose to revise its management actions for Chinook bycatch. The Council has historically taken many measures to manage salmon bycatch and will continue to proactively work to improve upon management measures as new information becomes available.

Comment 5-18: The DEIS lacks a credible analysis of the relationship between encounter rates of salmon in the pollock fishery, behavior of the pollock fishery itself, and salmon abundance. Though several of the alternatives focus on managing encounter rates of salmon, no credible analysis has been conducted to evaluate whether these measures reduce overall Chinook salmon bycatch. Nor is there an analysis of the effects these measures may have on salmon populations.

Response: NMFS agrees that encounter rates relative to salmon abundance are poorly understood. However, abundance of oceanic salmon is largely unavailable. Extensive GIS methods have been applied to bycatch patterns leading up to the current DEIS and many of the results from these studies remain in the document (e.g., Figs. ES-2, ES-3, 4-1, 5-27 through 5-31).

Regarding effectiveness of measures, NMFS disagrees. Bycatch of salmon is estimated through extensive observer sampling and this includes extensive sampling for length and age compositions. The approach to apply these data properly accounts for factors affecting actual returns of salmon. This is done by using information on the amount, timing, length, and age structure of the salmon bycatch.

Comment 5-19: There is no such thing as "surplus" fish that can be sacrificed for bycatch because every fish that returns to our rivers is important for meeting our subsistence needs, for supporting our small commercial salmon harvest, and for contributing to continued migrations of salmon and future generations of Alaska Native people.

Response: NMFS acknowledges this comment.

Comment 5-20: The DEIS admits that the cause of any weaker Chinook runs in western Alaska is not bycatch in the pollock fishery but food limitations for salmon in the ocean. DEIS at 196, 199. The food Chinook salmon rely on, nekton, is very sensitive to rising ocean temperatures. The DEIS contains no analysis of this issue and its effect on the availability of Chinook salmon.

Response: NMFS disagrees with this comment. The DEIS acknowledges that a definitive cause for declines in Western Alaska salmon runs is lacking. The degree to which food limitation is a primary factor in comparison to bycatch in the pollock fishery is also unknown. The statements on the referenced pages are misconstrued. In the first instance (page 196), the DEIS states "Weak runs during this time period (referring to the previous sentence of 1998-2002) have been attributed to reduced productivity in the marine environment rather than an indication of low levels of parent year escapements (Bue and Lingnau, 2005)." No comparison to other causes (i.e., bycatch in the pollock fishery) are mentioned. This section of the DEIS provides a descriptive overview of the food habits and ecology of Chinook salmon.

The second reference (page 199) is presumably related to the sentence (second paragraph) "It is speculated that spring sea surface temperatures on the eastern Bering Sea shelf likely impact growth rate of juvenile western Alaska salmon through bottom-up control in the ecosystem. Cold spring SSTs lead to lower growth and marine survival rates for juvenile western Alaska salmon, while warm SSTs have the opposite effect (NPAFC, 2001)". This simply references published literature on Chinook salmon growth patterns and acknowledges the complexity of ecosystem linkages. Extension and further speculation on ecosystem mechanisms is beyond the scope of this EIS. However, additional information on climate change and its relation to salmon productivity is to be included in the final EIS. Section 5.4 addresses this issue, and has been revised and appended to the CAR.

Comment 5-21: The dramatic rise in salmon bycatch in the pollock fishery threatens the sustainability of the Yukon River salmon stocks and the continuation of a subsistence way of life in interior Alaska.

Response: NMFS acknowledges this comment. The degree to which bycatch relates to declining Yukon River salmon stocks is unknown.

Comment 5-22: The Yukon River Chinook salmon run is clearly under stress biologically within the river system. This run does not need indiscriminate harvest by the Bering Sea pollock fishery prior to entering the river system. Huge bycatch in the pollock fishery must be curtailed at once.

Response: NMFS acknowledges this comment.

Comment 5-23: The pollock harvesters in the Bering Sea are contributing to the decline of the Chinook and chum salmon in Western Alaska. Although the pollock fishery is justified in providing food for the nation, Chinook salmon feed on the pollock and the bycatch cannot be avoided and will continue despite efforts to lower the bycatch.

Response: NMFS acknowledges this comment. The degree to which levels of bycatch are related to declining returns to salmon streams in western Alaska and elsewhere is unknown.

Comment 5-24: The continuing decline in the returning salmon stocks has to stop, and a key component with reversing this decline is the immediate reduction on the BSAI Chinook salmon bycatch.

Response: The purpose of this action (and analysis) is to make an informed decision on measures which to minimize bycatch of Chinook salmon in the Bering Sea pollock fishery. The degree to which levels of bycatch are related to declining returns to salmon streams in western Alaska and elsewhere is not well known.

Comment 5-25: It is a long held belief that commercial mid-water and bottom trawling are the primary human influences affecting salmon returns to western Alaska streams. Other influences such as severely cold winters, poor ocean conditions, predation, and migration also affect the number of returning salmon. It is apparent that chronic commercial bycatch is one of the major human influences in the recovery of salmon.

We appreciate that BSAI pollock fishery bycatch is not the only impact to Western Alaska Chinook salmon stock returns, but it has been shown to contribute significantly to mortality. (Meyers et al. 2004).

Response: NMFS agrees that the DEIS and studies such as Myers et al. (2003), Myers and Rogers (1988) and Witherell et al. (2002) have estimated the impacts of adult equivalent salmon returning to western Alaskan river systems as a result of bycatch in the pollock and other groundfish fisheries. However, the degree to which pollock fishery bycatch is impacting the runs on these rivers is not well known when compared with other factors as noted. Additional information will be included in the final EIS on the other factors influencing salmon productivity. Section 5.4 has been revised to include additional discussion of other impacts on salmon, and this section is appended to this CAR.

Comment 5-26: None of the proposed bycatch reduction plans proposes eliminating the entire bycatch, as doing so would mean the complete closure of the pollock fishery. Thus, in every instance where these comments provide a number of fish that would be added to escapement or to subsistence, commercial, or sport harvests, that number overstates the benefits of the proposed action because that number is based on what would happen if zero Chinook salmon were taken as bycatch.

Response: NMFS disagrees. Such comments are based on a misinterpretation of the results. The alternatives as presented are designed for cross-comparisons and no alternative includes zero pollock fishing (which is the only means of assuming zero Chinook catch). For comparative purposes, all alternatives are also contrasted against actual historical bycatch levels and their resulting estimated AEQs. This is to provide context for how various management alternatives under consideration in this action would save more or less salmon than the status quo (no cap) scenario.

Furthermore, the analysis specifically avoids adding AEQ values to returning salmon, escapement, or commercial, subsistence, or sport harvest. Qualitative estimates are provided in consultation with area management biologists from ADF&G to the extent that management might have differed if additional

salmon returned to specific river systems. A revised Table 10-59 (ES-13) is appended to this Comment Analysis Report. The text for the FEIS will be revised to help avoid such misinterpretation of results.

Comment 5-27: There is no conservation rationale based on escapement goals for a bycatch reduction program with respect to 46% of the Chinook salmon that originate outside of western Alaska that are incidentally caught in the pollock fishery.

Response: NMFS and the Council are mandated to reduce bycatch to the extent practicable under National Standard 9 of the MSA. While the primary impact analysis focuses upon impacts to western Alaska, the goal of minimizing salmon bycatch is not limited to only those salmon originating in western Alaskan streams, and proposed measures to reduce bycatch in the pollock fishery will reduce bycatch for salmon originating in all areas. Information on the impacts to Chinook salmon outside of western Alaska are also reported in the DEIS. To the extent that information is available on stock status and management for other aggregate regions (Cook Inlet, Southeast Alaska, Pacific Northwest) this information is also included in the DEIS.

Comment 5-28: A careful analysis of the facts reveals no support for the argument that there is a biological need to severely curtail Chinook salmon bycatch in the pollock fishery. Proponents of imposing additional restrictions on the pollock fishery to reduce Chinook salmon bycatch can find no biological basis for such restrictions based on escapement rates. The vast majority of the Chinook salmon stocks interacting with the pollock fishery is meeting or exceeding escapement goals. Even where runs are weaker, the number of Chinook incidentally taken in the pollock fishery is so small that it cannot be responsible for changes in salmon abundance. In other words, there is no biological issue in terms of meeting escapement but there is an issue of providing more fish for harvest. The fact that the DEIS glosses over and fails to examine these issues makes the DEIS legally inadequate.

Response: NMFS disagrees with this comment, in part. NMFS and the Council are mandated to reduce bycatch to the extent practicable under National Standard 9 of the MSA, regardless of whether there is a conservation concern with respect to salmon populations. The Council's approved problem statement and a description of the purpose and need for this analysis are provided in Chapter 1 of the DEIS. See response to comment 10-38. The analysis provides a comparison of the relative impacts of AEQ bycatch by river system (or aggregate grouping) but does not assert that bycatch is the limiting factor in salmon productivity. Further information on the data limitations in evaluating this are provided in response to comment 5-6 and in the revised section 3.3 attached to this CAR. The DEIS also explicitly includes qualitative information (Table 10-59, revised version attached, also included as Table ES-13) regarding the possible management-related changes that would have occurred as a result of additional fish by river system over the time period (2003-2007) of the analysis. These changes include both accruing additional fish towards escapement by river system as well as increases in harvest levels by commercial, sport and subsistence users.

Comments with specific suggested changes

Comment 5-29: Page 241, first paragraph, it is not accurate to state that the Northern District stocks "continue to trend sharply upward and most escapement goals are being met or exceeded." Perhaps based on older information (as the Clark, 2006 reference eludes). Some Northern District stocks have declined notably in the Deshka River in 2008 and Alexander Creek. This section should perhaps be updated with more current information from ADF&G.

Response: NMFS agrees that this section needs to be updated with current information from ADF&G. ADF&G staff have indicated that 2007 and 2008 estimates have not yet been finalized but may not support this statement of trending sharply upward. We will include updated information in the final EIS.

Comment 5-30: Figures 5-27 through 5-30 appear to be paired (27&28 and 29&30), where the second in the pair is a continuation to the right of the first. Why is the information presented in 5-31 (which portrays the B season) so different in format than the previous 4 figures, that showed the A season? Consistency across these figures would be helpful.

Response: NMFS appreciates the comment. The reason they are different is because they show different things. Full sets for both seasons had been presented in earlier drafts of the DEIS but were dropped to shorten the document. NMFS feels that this is acceptable and the level of information is provided in sufficient detail.

The A-season figures are arranged to easily show the spatial variability over 5-day intervals over different years. This is suited to the A-season since it is more concentrated in time and space. Including the same figures for the B-season would have required a larger scale map, and more weeks of data (many of which were blank).

Comment 5-31: Page 319, Table 5-75: Note a comment on this specific table referring to the mothership sector, but why are there not similar tables for the shoreside and catcher/processor sectors within this cluster of tables?

Response: NMFS appreciates the comment. This was a typographical error. This table (and the corresponding ones for other sectors) is found in Chapter 4 (specifically Table 4-13).

Comment 5-32: The past and present configuration of pollock trawl gear and its operation in the Bering Sea pollock fishery must be described. The DEIS states that, based on anecdotal information, the configuration of trawl gear has changed over time. See DEIS at 259. It then states that no information is available to analyze these changes. The DEIS must explain why this information is not available and whether efforts were made to obtain it. The configuration of trawl gear including mesh sizes, trawl sweeps or aggregating devices, net dimensions vertically and horizontally, speed and depth of towing and towing on or near the seafloor would all influence the rate and retention of salmon bycatch.

Response: NMFS agrees that this is an important issue. Unfortunately, the configuration and net mensuration data have not been collected and any anecdotal or voluntarily supplied information was unavailable for the analysis. This is a research priority that has been identified.

Comment 5-33: Page 259, first paragraph: the three tables referenced in the paragraph (5-9 through 5-11) are incorrect. Perhaps the text should have referred to tables 5-33 through 5-35?

Response: NMFS notes that the figures (not tables) referenced in this comment on pages 259-260 in the DEIS should have been numbered 5-33 through 5-35 in accordance with the figures included in this section. These figure reference corrections will be included in the FEIS.

Comment 5-34: Section 5.3.1.1 is a short, but important section of the DEIS. It presents historical Chinook bycatch information for each of the three sectors involved in the Bering Sea pollock fishery. Unfortunately, the information as presented is confusing and potentially prejudicial. The text of the entire section should be re-written. For example:

1). Seasonal Bycatch levels by sector. Remove Figures 5-36 and 5-37 from the analysis. Figures 5-36 and 5-37 show total A season and B season Chinook bycatch by sector for each of the years 1990-2007. The resulting graphs show widely diverging salmon "catch" patterns overtime between the three sectors. The text suggests that some conclusion can be drawn from those patterns. But no where is there any explanation that the differences in "catch levels" between sectors in any given year and/or over time are, to a certain extent, simply due to the amount of pollock each sector caught during the year(s) in question. This is complicated further by the time period spanned by the charts: 1990-2008. That period covers times of the open access "race for fish" when each of the pollock sectors competed with each other for a share of the common pollock quota pool (1990 ~ 1992); the period of inshore/offshore allocation measures that created and then changed sectoral shares of the annual pollock quota periodically (1993-1999); and the years in which the fishery has operated under the allocation provisions of the AFA--2000-present. Thus, to a great extent, the changes in salmon bycatch shown in Figures 5-36 and 5-37 simply reflect different allocations of the pollock quota that were imposed in the sectors' respective shares of pollock over time. Simply put, any depiction of salmon bycatch levels without some adjustment for the amount of pollock caught by each of the sectors during the period in question paints an extremely erroneous picture-a picture that is irrelevant to any determination about how to address salmon bycatch and potentially prejudicial to the sector(s) that happened to catch the most pollock in any given year. For this reason, the charts and graphs shown should be limited to comparative rates of salmon bycatch (by sector) over time.

2) Figures 5-38 and 5-39 should indicate if CDQ catch and bycatch is included in the bycatch rate calculations. These figures show relative rates of salmon bycatch (Chinook/1000 tons of pollock). For that reason, these figures are more informative than Figures 5-36 and 5-37. The text that accompanies Figures 5-38 and 5-39, however, does not indicate whether or not CDQ catch is included in the comparative rate lines shown for the catcher/processor and mothership sectors. In our view, the preferred approach should be to include CDQ pollock catch and related salmon bycatch along with the non - CDQ catch and bycatch in the same rate calculations for those sectors and vessels engaged in the harvest of both CDQ and non-CDQ pollock. In practice, a vessel with CDQ pollock normally harvests both CDQ and its non-CDQ pollock as part of a normal fishing trip. It is the same boat, the same skipper and the same crew, fishing in the same places that harvests both COQ and non-CDQ pollock---on the same trip. Any attempt to distinguish CDQ from non CDQ tows (and the salmon bycatch attributed to such tows) made by the same boat would be arbitrary at best. At worst, it could be unfair and prejudicial.

3) Tables 5-22 and 5-23 need clarification as well. a) First, the symbols used in these tables (and elsewhere in the document) to depict the three pollock sectors are somewhat confusing. There should either be a legend indicating what "M", "P" and "S" mean; or symbols that are more familiar to the public should be used: "CP" for catcher processors; "MS" for vessels delivering to motherships; and "SS" for vessels delivering to shoreside processors. b) Second, the rate of bycatch should be shown in the metric most commonly used to depict bycatch--a "rate per ton", instead of the "rate per 1,000 mt"' as used in the tables; c) Third, the "mean" and "deviation from the mean" values used in the tables is not a familiar way of showing/comparing bycatch. Simple "rates per ton" with an average over time at the end would convey the message in a more meaningful way to the reader. d) Fourth, the text that accompanies the tables should indicate if CDQ catch and bycatch is included in the data series. As noted above, we think it should be.

Response: NMFS disagrees that the figures are confusing. They are clearly labeled and show the actual pattern of actual estimates. The allocation is irrelevant for this presentation. NMFS however recognizes the sensitivity and hence responded by showing a longer time series of the rates by sector (see the revised section 5.3.1.1 is attached as Appendix 4). This will replace section 5.3.1.1 in the FEIS.

Regarding tables 5-22 and 5-23, a legend was provided elsewhere for these abbreviations. However, to help minimize confusion, the more standard abbreviations of CP, MS, and SS have been added. Regarding the request to express the rate per ton instead of the rate per 1,000 t, NMFS feels that this is clearly labeled and presenting integer numbers adds clarity in this case. Further explanation regarding the utility of comparing bycatch rates by sector in reference to mean values has also been included in this section for increased clarity. The text has been modified to denote that CDQ has been included (see the revised section 5.3.1.1 is attached as Appendix 4).

Chapter 6 comments

These comments are on Chapter 6, chum salmon abundance, stock of origin, impacts to chum stocks.

Comment 6-1: Put measures in place to eliminate or at least minimize the non-Chinook bycatch in the Bering Sea. Support closure of the pollock fishery after a cap has been reached. Limit the total poundage of fish caught, including by-catch. Fishermen would then have to quit fishing when the reach that total amount, whether they caught the kind of fish they were targeting or bycatch fish. Fishermen would have to bring whatever they caught to shore and sell it and whatever escapes will return to their spawning grounds, regardless of species. This is a much better option than having fishermen throw the chum salmon back into the sea, dead. The Nenana area of the Tanana River have had a steep decline in salmon returns. The people in the Nenana area are very dependent on chum salmon as a food source for themselves and our dog teams. So, in many ways their lifestyle is dependent upon the return of the salmon.

Response: NMFS acknowledges this comment and notes that changes to bycatch management measures for non-Chinook salmon are being considered separately and are outside of the scope of this analysis. For accounting purposes all non-Chinook salmon are reported as one aggregate group, however non-Chinook salmon are comprised of >99% chum salmon as described in section 6.4.2 of the DEIS. The Council is considering separate management measures for non-Chinook salmon. Measures under consideration for non-Chinook salmon species include hard caps on the pollock fishery as well as area closures. These measures are being considered separately from this DEIS which specifically addresses Chinook bycatch management. People's dependence upon chum salmon will be considered in conjunction with the forthcoming analysis on separate management measures for non-Chinook salmon species.

Comment 6-2: The Tanana-Rampart-Manley areas are also concerned about the severe detrimental effect that the pollock fishery's salmon bycatch is having on salmon runs in the Yukon and Tanana rivers. The bycatch of other species, such as chum salmon, needs to be addressed immediately. The pollock fishery is a 'dirty' or wasteful fishery that is putting one of the world's last wild salmon runs in jeopardy.

Response: NMFS acknowledges this comment. The Council is scheduled to discuss proposed alternatives to address non-Chinook (chum) salmon bycatch in the Bering Sea pollock fisheries at its June 2009 meeting.

Comment 6-3: DEIS does not mention that chum salmon in Nome (subdistrict 1) were managed under a Tier II subsistence strategy, the first and only time for a fish stock. The Tier II scoring and permit system limited effort and harvest because chum salmon numbers did not meet subsistence needs. Chapters 6 and Chapter 10.3.2.

Response: NMFS agrees and notes that updated information on stock status and management information will be included in the Final EIS. We also note that separate management measures are under consideration by the Council for non-Chinook salmon bycatch management. This forthcoming analysis will include comprehensive information on chum salmon stock status and management.

Comment 6-4: NMFS must include an analysis of the environmental and economic effects that low abundance Chinook management by ADF&G has on the optimum yield of the Yukon River summer chum fishery. This information is necessary to provide to the Council and other decision makers like the public. The Council's preferred alternative must comply with MSA National Standard 1. Low Chinook runs have affected the management of the summer Chum runs on the lower Yukon the Council's preferred alternative must take into account that management measures currently being considered may preclude the optimum yield of the Yukon River summer chum commercial fishery.

Response: NMFS disagrees. An overview of stock status and management of Yukon River chum salmon are provided in sections 6.2.4 and 10.3.5 of the DEIS. A discussion of the impacts of low abundance Chinook management on the management of Yukon chum is provided in these sections as well as the related sections on Yukon Chinook management (5.2.4 and 10.3.5). This information is provided for context on the broader impacts that decreased Chinook returns have on other fisheries such as chum salmon management on the same river system and will be updated in the final EIS to reflect additional management restrictions through 2008. This information is sufficient in the context of the decision point for the Council with respect to Chinook salmon bycatch management measures. The Council's preferred alternative must comply with all of the National Standards.

Comment 6-5: It is important to note that in years of low Chinook salmon returns chum salmon are a vital subsistence resource, and the primary marketable fish on the Yukon River. In such times management measures limit and delay the summer chum fisheries to allow Chinook salmon to pass up river. In 2008 failed Chinook salmon runs on the Yukon River prevented the harvest of a significant number of harvestable summer chum resulting in forgone revenue of millions of dollars to the WAK region. The Yukon River commercial chum harvest was economically impacted by in-river Chinook salmon management actions limiting fishing effort. The forgone commercial harvest was close to 1 million fish. This caused a large adverse economic impact on the residents and businesses of the lower Yukon and will have potential negative environmental effects due to the over-escapement of chum. Forgone chum salmon harvest due to Chinook salmon management measures averages $18,500,000 annually or 50% of the pre capita income for the region.

Response: NMFS acknowledges this comment. An overview of stock status and management of Yukon River chum salmon are provided in sections 6.2.4 of the DEIS. A discussion of the impacts of low abundance Chinook management on the management of Yukon chum is provided in these sections as well as the related sections in 10.3.5 on Yukon Chinook management (page 592). This information is provided for context on the broader impacts that decreased Chinook returns have on other fisheries such as chum salmon management on the same river system. Updated information through 2008 on restrictions in the chum fisheries in response to management of Chinook will be included in the final EIS.

Chapter 7 comments

These comments are on Chapter 7; other groundfish, other prohibited species, and forage fish.

Comment 7-1: Bycatch in the trawl fleet negatively affects other fisheries, such as halibut, and causes billions of dollars of economic waste. Halibut brings in millions of dollars to many communities and to the State of Alaska. Trawl bycatch of halibut is affecting commercial quotas as shown by the IPHC cuts across the board for 2009.

Response: NMFS believes the comment is not necessary to understand potential impacts from the alternatives considered in the DEIS. The alternatives considered in the DEIS do not change halibut PSC catch limits for the Bering Sea trawl fisheries, nor do they change allocation of halibut. The DEIS in section 7.3.2.2 on pages 366-367 discusses management of the halibut PSC, including a detailed discussion on the overall trawl limit for PSC halibut and potential impacts of the alternatives on halibut (DEIS section 7.3.3 pages 368-369).

Comment 7-2: The DEIS assumes pollock fishermen will move to new pollock fishing grounds if Alternative 2, 3, or 4 is adopted. DEIS at 165. The DEIS does not consider the potential problem of increased interactions with other species, such as non-pollock groundfish, squid, sharks, seabirds, etc., that may be encountered on these more distant fishing grounds.

Response: NMFS disagrees. The DEIS considered the potential impacts on non-pollock groundfish, squid, sharks, and seabirds. The DEIS discusses potential interactions of the alternatives on non-pollock fish species in Chapters 7 and seabirds in Chapter 8.

Chapter 8 comments

These comments are on Chapter 8; marine mammals, seabirds, EFH, and the ecosystem.

Comment 8-1: The final EIS would be enhanced if the findings in Section 8.2.4.1 could be incorporated into the final analyses and appropriately cited. " The USFWS has been working with Dr. Paul Sievert and Dr. Havier Arata of the U. S. Geological Survey to develop a status assessment of Layson and Black-footed Albatrosses . . . "

Response: Based on discussions with Alaska Region US Fish and Wildlife staff, this status assessment is not available at this time. The suggested change to add reference to Dr. Sievert and Dr. Havier will be done in the final EIS.

Comment 8-2: Harvesting pollock is the main reason the Steller sea lion numbers are diminishing.

Response: Steller sea lions have experienced a population decline, and pollock is an important prey species for Steller sea lions. Steller sea lion diet is dependent on the type of fish that occurs in the area where Steller sea lions forage. Stomach analysis of Steller sea lions taken in the Eastern Bering Sea in the 1980s showed pollock is an important prey species. NMFS is preparing a biological opinion which will take a hard look at the effects of the groundfish fisheries on Steller sea lions and their critical habitat. This document will contain the latest scientific information on Steller sea lions and the potential effects of the groundfish fisheries, including the effects of the pollock fishery on Steller sea lions, on their designated critical habitat, and on their recovery. A draft of the biological opinion is scheduled for release in August 2009. We may know more at that time whether harvesting pollock could be a main reason for the Steller sea lion population decline.

Comment 8-3: High Chinook salmon bycatch affects the very ecosystem on which all species depend upon, marine birds, mammals, crab, squid and all fish. Even your agency reports continuing declines of Northern Fur Seal and Steller Sea Lions in the Bering Sea. Removal of salmon from streams will also have a hugely negative effect on those ecosystems as many mammals such as bear, wolves and bald eagles depend upon returning salmon for survival.

Response: NMFS agrees that Chinook salmon are an important part of the marine ecosystems of the Bering Sea. The effects of salmon bycatch on Northern fur seals and Steller sea lions depend on the amount of salmon eaten by these species. Northern fur seals eat mostly pollock, and Steller sea lions usually eat salmon at times and locations where the fish are gathered for returning to streams to spawn. Neither of these marine mammals is primarily dependent on salmon for prey. Stomach samples from Steller sea lions taken in the Bering Sea in the 1980s did not contain salmon, but this may have been due to the timing or location of the sampling. Northern fur seal and Steller sea lions appear to be affected by fish abundance. Whether and what extent fish abundance is affected by fishing or environmental change are unknown. Nor do researchers know how alteration of fish abundance (either pollock or salmon) influences fur seal or Steller sea lion population trends.

NMFS agrees that the population of northern fur seals continues to decline as seen in decreasing pup counts in the Pribilof Islands. The only Steller sea lion trend site surveyed in the Bering Sea is Bogoslof/Fire Island. This site is grouped with other trend sites in the eastern Aleutian Islands group.

Since 2004, the abundance of Steller sea lions in the eastern Aleutian Islands group has consistently increased, averaging 7% annually.

NMFS agrees that salmon play an important role in the coastal terrestrial ecosystems, by bringing marine nutrients into the inland environment as the salmon are taken from the streams and consumed by terrestrial predators. The impact of salmon bycatch on the terrestrial environment will depend on the origin of the salmon caught, and the amount of salmon that is prevented from returning to the natal streams by pollock fishery bycatch. We currently have information to a regional level for the origin of salmon incidentally taken in the pollock fishery. Future genetic research on bycaught salmon should provide finer details on the salmon origin. It is not currently possible to determine the level of effect of salmon bycatch on terrestrial ecosystems, especially to an individual stream level.

Chapter 9 comments

These comments are on Chapter 9; environmental justice.

Comment 9-1: The environmental justice analysis is inadequate and only describes potential pollock industry employment impacts.

Response: The environmental justice analysis in Chapter 9 covers a wide range of impacts to identified low income and minority communities, including impacts associated with subsistence, commercial, and sport harvest of salmon. Section 9.4.9 of the analysis describes employment in the shoreside pollock process sector. This section does include relatively more quantitative descriptive information than other sections of Chapter 9.

Nevertheless, the environmental justice analysis provides quantitative descriptive information on salmon fisheries permit holder revenues, and directs the reader to the economic analyses in Chapter 10 for more information on salmon fishing and processing jobs. Chapter 10 contains considerable quantitative information on employment and revenues in non-pollock Western Alaskan fisheries and fish processing industries. For the Final EIS, the environmental justice analysis in Chapter 9 and the economic analysis in Chapter 10 will be more closely integrated.

Comment 9-2: The DEIS does not adequately analyze the EJ implication of the action. Increased salmon bycatch places a disproportionately high burden on Native Alaskan communities because of the central importance of salmon. The DEIS does identify the impacted minority populations required under Executive Order 12898. However the DEIS is severely inadequate in assessing the disproportionate impacts placed on these populations.

Response: NMFS disagrees that the environmental justice section is inadequate. The environmental justice analysis provides discussions of the importance of subsistence, commercial, and sport uses of Chinook salmon, the prohibited species donation program, chum salmon, the community development program, pollock deliveries to shoreside processors, marine mammals, seabirds, groundfish, forage fish, and prohibited species. The discussions are meant to provide sufficient background to support the analytical discussions, and are not meant to be encyclopedic. They do clearly describe the significance of Chinook salmon in Western Alaska. The analysis evaluates the impacts of the alternatives for six regions with respect to (a) Chinook uses, (b) CDQ entity impacts, (c) minorities in pollock harvesting and processing, and (d) users of chum salmon, marine mammals, seabirds, and other fish species.

In response to this and other comments, NMFS intends to more closely integrate the environmental analysis in Chapter 9 with the economic analysis in Chapter 10, and to add more information on the cultural context of subsistence fishing activity in the action area.

Comment 9-3: In the Environmental Justice chapter, characterizing our time immemorial fishing and hunting tradition as an "underground economy" is terribly hurtful and untrue. Underground economies are commonly understood to be illegal, black market, or purpose fully hidden. To describe the mixed economy of rural Alaska in this way exposes the ignorance of the agency as to the reality of subsistence and subsistence exchanges. Customary trade is legal laws and regulations exist in both the State and Federal regulatory system that legitimize customary trade transactions.

Response: This concern is raised by the following sentence. "Significant numbers of transactions also appear to take place in barter or informal trades and exchanges in informal markets which constitute an 'underground economy.'" NMFS meant to emphasize the undocumented nature of these transactions, and did not intend to imply that these were secret or illegal transfers of Chinook salmon. NMFS has rewritten the sentence to read, "Significant numbers of transactions also appear to take place through undocumented barter and customary trade."

Comment 9-4: The DEIS notes that its analysis is based solely on information from the "above-ground economy. For all intents and purposes, it is stating that some of the most important aspects of coastal communities, and the ones that are likely to be most impacted by the proposed actions, are being purposefully ignored.

Response: NMFS is eliminating the term "above-ground economy" because it was meant to contrast with another expression, "underground economy," that occurred in the preceding paragraph, and that is also being eliminated. See response to comment 9-3. NMFS substituted "undocumented" as a descriptor for transactions in the preceding paragraph, and will substitute "documented" as the descriptor in this paragraph.

The purpose of the analysis in which this sentence occurs is to determine whether there are low income communities in the region. Leaving out a source of value in this context can only make it more likely to determine that there are low income populations in the region. Under the circumstances this may be justified as providing a precautionary perspective. In any event, any population engages in undocumented non-market activity that is not entered into income statistics used to make income status determinations. Once the low income determination is made, NMFS does discuss the undocumented barter and customary trade that take place and provide value to local populations.

Comment 9-5: NMFS's lack of understanding can be seen in section 9.4.2 with the repeated uses of the term "evolve." To use the term "evolve" is to imply that a society constantly working towards something better than what it currently is (or was). This linear view of change, as applied in the DEIS, implies that successfully adapting to a monetary economy is the next step in acculturation into a Euro-North American lifestyle (and the "above-ground economy").

Response: NMFS uses the term "evolve" to refer to the changes in the state of the Native Alaskan cultural system and practices through time as Native communities come in contact with changing outside economic, cultural, or physical influences. NMFS does not believe it has used the term in the sense described in the comment. For example, it refers to the evolution of the pre-contact Native cultures and to evolution of the mixed subsistence-market economies "somewhat independently of the broader culture."

NMFS will remove the word "evolve" from the following sentence on page 457: "It is possible for hunter/gatherer societies to evolve and successfully adapt during contact with a monetary market economy 'in the sense that the society is maintaining its essential organization around subsistence fishing, hunting, trapping, and gathering activities and traditional exchange, while at the same time, incorporating new forms of market production, wage employment, and imported technologies into the subsistence-based socio-economic system'." The original quotation from Wolfe (1984) referred to adaptation rather than evolution, and the word "evolve" used here may not convey the author's intent.

Comment 9-6: The EJ section fails to recognize the history of racism against Native Alaskans in the North Pacific by the seafood industry and the enslaving of Aleut fishermen by the U.S. Bureau of

Fisheries. Racial stratification still occurs under this Council's watch. The DEIS proves that this racial discrimination continues with nary a word from the Council, except higher quotas to the corporations practicing racial discrimination. The International Covenant on Civil and Political Rights says "In no case may a people be deprived of its own means of subsistence".

Response: The analysis is concerned with the alternatives under consideration and their potential for imposing a disproportionate adverse impact on minority and low income communities. By addressing the impact on western Alaska subsistence and other resources uses, this analysis addresses the requirements of the International Covenant.

Comment 9-7: The potential impact to marine mammals is of key concern to our tribal members. The EIS does not adequately describe the effects of the potential loss of marine mammal hunting opportunities, cultural effects, or social effects.

Response: NMFS believes the EIS adequately addresses the marine mammal issues raised by the alternatives. Section 8.1 of the EIS discusses the impacts of the actions on marine mammals themselves. Section 9.4.10.1 of the Environmental Justice analysis discusses the subsistence importance of marine mammals, and Section 9.5 draws on Section 8.1 and Section 9.4.10.1 to discuss the implications for relevant communities.

Comment 9-8: Because the benefits to western Alaska from the BSAI pollock fishery have been increasing at a significant pace, it may be difficult to fully describe the situation. Relevant document include annual reports of all six CDQ groups for the past few years, the State's Blue Ribbon Report on the CDQ program, the 2007 WACDA report on the CDQ program, and the January 2009 Northern Economics study for the Marine Conservation Alliance, which includes a section on the CDQ program. Also, CVRF alone will be providing over 1,000 jobs for region residents in 2009, and continues to provide tens of millions of dollars of benefits to our region annually.

Response: Future document revisions will include these references. NMFS has prepared an expanded CDQ section which is attached to this Comment Analysis Report as Appendix 11. The FEIS will have a complete listing of references and an expanded description of revenue derived from BSAI pollock fishery. Aggregate CDQ royalty data and estimated forgone royalty revenues will be described using the best available information. The new CDQ section includes selected statistics about the aggregate benefits to CDQ communities as well as specific examples of fisheries infrastructure investments that could be affected by a decrease in BSAI pollock landings. The Northern Economics Report, January 2009, was not available at the time the DEIS was written but is incorporated into the revised CDQ section.

Additional information that would improve the analysis impacts on benefits to CDQ communities would be to estimate the forgone values of pollock royalties to the individual CDQ entities under each alternative. This analysis will be added to the Final EIS if that information becomes available.

Comment 9-9: The DEIS presents the associated impacts of each alternative on minority and low income communities through a series of tables. For many readers, it is difficult to understand the scope of impacts when presented in tables. Thus the final EIS should highlight in a clear and descriptive fashion what the impacts are for each alternative. The DEIS fails to provide a meaningful analysis of how each alternative impacts the subsistence harvest and commercial salmon uses. A table highlighting impacts is not analysis. Nor is a table an adequate means of detailing how each alternative will affect western and Interior Alaska communities.

Response: Given the complexity of the discussion, which required a review of the impacts of four alternatives (and their components) across six regions with respect to four broad categories of resource users (Chinook salmon users, CDQ entity beneficiaries, minorities in pollock harvesting and processing, and users of other marine resources such as chum salmon, marine mammals, seabirds and other fish species), there is not one obviously best way to summarize the impacts. NMFS used the text tables to present the results of the analysis because they helped keep the various threads of the analysis in view and facilitated comparisons of the information. A text approach would have had to make use of a large number of headings and subheadings to keep the elements in perspective and to that extent would have become somewhat like an extended table.

NMFS believes it has provided a meaningful and understandable analysis of the impacts. The tables are not the analysis, but the method of organizing the analysis in a coherent fashion. The cells in the tables draw on other sections of the DEIS, and pull together and highlight the differential impacts of the alternatives on different populations of minority and low income resource users in the different areas.

Comment 9-10: In considering the issue of meeting the need for food among economically disadvantaged people, it should also be noted that salmon bycatch in the pollock fishery is often used for this exact purpose through the Prohibited Species Donation ("PSD") program which was initiated in 1996 to reduce the amount of protein being lost. The PSD program allows salmon bycatch to be retained and distributed to economically disadvantaged individuals by non-profit hunger relief organizations. While these individuals are not subsistence fishermen in Alaska, the facts are that during the 12 years the PSD program has been in place, the non-profit group administering the program has received a Marine Stewardship Award and has distributed 2 million pounds of steaked and finished salmon to poor and homeless people. DEIS at 527 - 529. This program provides nearly 650,000 meals each year to people who have access to "meager and often inadequate food." Id. at 529. Over its 12 year life, the PSD program has provided approximately 7.8 million meals to the poor and homeless.

Response: NMFS agrees, and encourages participation in the PSD program to reduce waste and provide high quality protein to those in need. However, these programs do not necessarily address the special needs of minority populations, or support minority cultures as they would if the fish were harvested in Alaska subsistence fisheries. The volumes supplied are small compared to overall food needs of low income persons in the U.S. Thus, these programs were not considered to be a significant source of disproportionate impacts on minority or low income communities. Chapter 10.2.5 of the RIR provides a more extensive discussion of this program.

Comment 9-11: On p.461, the DEIS analyzes the Prohibited Species Donation Program and notes that none of the salmon bycatch donated through the program makes it to Western Alaska villages, who are most affected by increased salmon bycatch. Consider the Tanana Chiefs' proposal presented to the Council at its February 2009 meeting, which would require the pollock fleet to package and ship salmon PSC to Western Alaska villages with the pollock industry absorbing the cost. Although this proposal will not substitute for adult equivalent Chinook salmon that may be available to these communities otherwise, nor provide a substitute to the cultural traditions the members of these communities engage in while harvesting Chinook salmon, analysis of this proposal may uncover whether an economic incentive to reduce salmon bycatch through this mechanism exists.

Response: Regulations at § 679.26 require any salmon donated to be handled by an authorized distributor. Any organization that can meet the requirements for a PSD program permit may apply to NMFS to become an authorized distributor. To date, only one authorized distributor, SeaShare, is permitted to handle donated salmon. Because of the logistics of handling and shipping the fish and the

limited resources for the program, only Pacific Northwest residents have benefited from the donated salmon. The PSD program is currently a voluntary program, with participants paying the cost of handling the fish. Having more authorized distributors that could provide donated salmon to Western Alaska communities would be a good way to reduce salmon waste in the pollock fishery. More information about the PSD program is available at http: //www.fakr.noaa.gov/ram/psd.htm. A mandatory program recommended by the commenter would require a separate analysis and Council action before rulemaking and implementation.

Comment 9-12: The chapter on Environmental Justice is lacking an appropriate scale analysis of the impacts to low-income communities in western Alaska. The EJ analysis fails to apply the EJ principles to Alaska Native coastal communities in detail or to provide much analysis concerning them. Why does the analysis spend more time addressing potential impacts to minority populations working within the pollock industry than on resident Alaska Native populations which are likely to experience far greater impacts?

Response: The Environmental Justice Chapter used a regional rather than individual community approach to the analysis. Potentially affected populations were divided among six regions (Kotzebue Sound, Norton Sound, the Yukon River and river delta, the Kuskokwim River and river delta, Bristol Bay, the Alaska Peninsula, Pribilof Islands, and Aleutian Islands, and Persons living outside western and interior Alaska). The division reflected a balance between a consideration of regionally variation and analytical tractability. The analysis does not devote more space to the impacts on pollock industry populations than it does to the impacts on western Alaska Natives. The analysis devotes about 29 pages to the description of western Alaska Native population use of resources and to the impacts of the proposed actions on those populations. It devotes about 9 pages to other populations.

Comment 9-13: For thousands of years, Alaska Native communities have long used the marine resources of the Bering Sea for both subsistence practices and cultural identity. It is also well-documented that those who live in the region year-round have high cost of living expenses. The data on these minority populations should be considered by the Council when considering all alternatives. Although NOAA Fisheries recognizes the importance of the resources to these communities, the agency has inadequately addressed the disproportionate impacts of Chinook salmon bycatch on these communities. As a result of high fuel prices in combination with a rapidly declining economy, the importance of subsistence food to physical and cultural survival in Western Alaska has become increasingly more important. In this case, salmon bycatch results in a disproportionately adverse economic impact on subsistence and commercial economies in Western Alaska communities dependent on salmon.

Response: NMFS believes the environmental justice analysis addresses the issues raised in the comment. It discusses the importance of salmon to the regional culture (page 457), the importance of subsistence salmon as a food source (pages 453-454), and their importance as a source of income (pages 457-460), the high cost of living in the region (page 453), and the high levels of poverty and unemployment and relatively low incomes in Western Alaska (pages 450-451). Many of these issues are also addressed in the economic analysis in Chapter 10. NMFS will more closely integrate the two analyses, so that readers of the environmental justice analysis will be more aware of information in Chapter 10.

Comment 9-14: Chapter 9 states that poverty and income statistics should be adjusted to reflect monetary value of subsistence production to provide a relatively comparable measure of income. The estimation of this measure would illustrate the economic hardship incurred by Alaska Native tribes and communities as a result of potential loss of subsistence salmon resources. For instance, what would be the cost of a person living in Rampart on the Yukon River to replace their subsistence diet with an equivalent proxy protein source? This estimation should also incorporate average income in relation to average food costs as they

relate to the cost of harvesting subsistence salmon, a reasonable subsistence proxy that could replace salmon, and a reasonable commercially-purchased proxy that would substitute subsistence salmon. Nonetheless, the Council should not neglect the value of the subsistence harvest of salmon to Native and family traditions, which are considered intrinsic values within the Alaska Native community.

Response: Chapter 10 does consider studies that have attempted to value recreational and subsistence use and that identify a relation to replacement costs (page 532); however, lacking data on subsistence household food expenditures it is not possible to quantify replacement costs. NMFS is not aware of any study, or data source, that documents subsistence household food expenditures in Western Alaska and the available evaluations studies (see page 532) are not a suitable proxy. Furthermore, the value of subsistence use of Chinook salmon in Western Alaska likely exceeds replacement food costs due to the cultural significance of the subsistence lifestyle. Thus, replacement cost estimation is neither possible, nor a true representation of the value of subsistence harvest. Nonetheless, in recognition of the apparent imbalance in the treatment subsistence uses of Chinook salmon, we are reorganizing subsistence information into a single section of the FEIS, and providing additional information, in order to better reflect its importance. This information will be presented to the Council prior to final action. Chapters 9 and 10 will be modified to make their interconnections clearer.

Comment 9-15: Substantial information for evaluating and estimating subsistence economic values exists and additional information should be sought. On p.453, the DEIS notes that the Magdanz study of 2007 analyzed subsistence consumption for the Norton Sound and Port Clarence areas. It cited that "up to a third of the [subsistence] meat and fish was salmon." There are other studies that show regions in the Bering Sea with even higher consumptions of subsistence salmon. For example, in a study cited by the Alaska Department of Community and Economic Development, on its website at: http://www.dced.state.ak.us/dca/AEISlBristol/Subsistence/BristoISubsistenceNarrative.htm, accessed in December of 2007, the Department said that "the average; subsistence fish consumption for Bristol Bay residents' accounts for 55 percent of all subsistence foods utilized."

Response: The estimates cited on page 453 and 454 were meant to illustrate the propositions that "Subsistence foods in general are important components of regional diets," and that "Chinook salmon varies in importance in regional diets, and can be significant." NMFS believes that the citations from Magdanz and Ballew at al. adequately supported these propositions. Section 9.4.2, in which this discussion occurs, also places the importance of subsistence foods in the context of the high cost of living and of alternative food sources in rural Alaska, of their distribution through different types of gifts and exchange, and of their cultural importance to the Native communities. NMFS attempted to access the suggested web site from the Alaska Department of Community and Economic Development in March 2009, and found that the Department had removed the content from the site and had indicated that it removed the material because of concerns about outdated and inaccurate information. The Department of Commerce website was formerly described as the Alaska Economic Information System (AEIS).

Comment 9-16: On p.459, the DElS evaluates the costs of subsistence fishing in Holy Cross and Tanana, which included costs for gas, clothing, equipment and other supplies. These subsistence fishing expenses are expected to stay the same or rise in the future according to economic projections, so it is important to for the Council to consider this in any decision-making. It is also important that the Council continue to evaluate the living expenses for residents of these communities compared to urban centers of Alaska such as in Anchorage. Therefore, while it may be difficult, it is not impossible to conduct an economic analysis of the value of subsistence salmon in the rural Alaska Native economy.

Response: The environmental justice analysis reported these examples to illustrate the importance of access to cash or credit for participation in modern capital intensive subsistence harvests. This, in turn, helped to illustrate the importance of income from commercial Chinook salmon fishing. The analysis also discusses the relatively high cost of living in rural Alaska (page 453).

Comment 9-17: On p, 474, the DElS notes that increased salmon bycatch may also adversely affect rural and indigenous people on the Yukon River in Canada. Under Executive Order 12898, NOAA Fisheries is only required to address minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Marianas Islands. However, because salmon is a transboundary migratory species, NOAA Fisheries has an ethical and moral obligation to consider the effects of salmon bycatch on low-income populations wherever they occur. If there are available data on subsistence harvest of salmon in Russia or Canada, the EIS should consider these potential impacts. NOAA Fisheries has jurisdiction over the fisheries that affect the ecosystems, species composition, and thus communities throughout the salmon-spawning watersheds that feed into the North Pacific. The Council should therefore consider all available data on the health of the salmon runs in Canada and Russia and the level to which those runs support subsistence harvest. This would allow the Council and the public to further understand the impacts of salmon bycatch for all peoples who depend on salmon for subsistence purposes whether in the Kuskokwim River in Alaska, the Yukon River in Canada, or the Bolshaya River in Kamchatka. While genetic information indicates that the number of Russian salmon captured in the U.S. pollock industry is relatively small, like with the runs of the Pacific Northwest, a small number may constitute the entire run in some cases. Thus, the DEIS should acknowledge the transboundary nature of salmon stocks and the potential implications that it may have on other indigenous cultures.

Response: The environmental justice analysis includes a paragraph alluding to potential impacts to minority and low income populations in Canada's Yukon Territory. However, given the explicit instructions at the start of the executive order to examine effects on "on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands," (E.O. 12898) NMFS has not done an environmental justice analysis for the Canadian populations. NMFS will generalize the short existing discussion on effects in Canada to note the potential for effects on minority or low income populations outside of the United States and Canada, but NMFS will continue to restrict the analysis itself to residents of the U.S. The instructions of the Executive Order are very clear, and consistent with other common evaluation practices. For example, cost and benefit analysis is routinely carried out from an accounting stance that restricts it to national residents.

Comment 9-18: The DEIS limits its focus to the direct economic impacts and nourishment losses. However, there are impacts beyond these that must be considered. For example, there is no analysis of the impact of bycatch loss of salmon on the culture and traditions of the villages throughout western and interior Alaska, especially the subsistence way of life and the economic viability and cultural integrity of small communities. The effects of the salmon loss from bycatch reach far beyond the fishermen and the dining table; loss affects families throughout the region, impacting the family unity fostered through the work of harvesting, cutting, smoking and sharing the fish. Additionally, with lower harvest numbers, communities may be forced to spend more time, if possible, harvesting salmon to meet their subsistence needs. Some may not extend the time they spend harvesting salmon because a longer season fails to allow for adequate drying or prevents having enough time to pick berries. These indirect impacts are not addressed in the DEIS. The DEIS cites only public comments for evidence that Chinook salmon are important to the cultural, spiritual and nutritional needs of Alaska Native people, and that strong returns of healthy salmon are critical to the future human and wildlife uses of those fish and to the continuation of

the subsistence way of life. What are the impacts along the Yukon and Kuskokwim? The DEIS fails to address this important question in a manner that provides decision makers with enough information to determine whether one alternative is more beneficial than another. There are numerous books and peer-reviewed papers examining this essential role of subsistence in both qualitative and quantitative means.

Response: Chapter 9, Section 9.4.2 describes subsistence harvests of Chinook salmon, and Chapter 10, Section 10.3 provides detailed descriptions of regional subsistence salmon fisheries throughout western Alaska. Section 9.4.2 directly addresses the cultural significance of Chinook salmon subsistence harvests, drawing in part on the research of Robert Wolfe in the paper Commercial Fishing in the Hunting-Gathering Economy of a Yukon River Yup'ik Society" Etudes/Inuit/Studies. 8 (special issue): 159-183, and in Robert Wolfe and Robert Walker, "Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts." Arctic Anthropology. 24(2):56-81. NMFS will modify the analysis with a more extensive discussion of the subsistence economy and culture and will tie the analysis more closely to existing material on subsistence the economic analysis in Chapter 10.

NMFS believes that the current discussion provides decision makers with sufficient information to evaluate the alternatives before them. The descriptive material in the analysis, and the comparisons of the alternatives, do contrast five regions of Western Alaska with respect to Chinook salmon. Separate regional analyses are provided for the Yukon River and the Kuskokwim River.

Comment 9-19: The goal of E.O. 12898 is to identify disparate impacts to minority populations. It is important to note the significantly different impacts on Native populations who depend on salmon for sustenance and livelihood as opposed to non-resident processing workers for whom neither livelihood nor culture is tied to pollock processing communities. Further, in assessing disparate impacts, the median family incomes, which far exceed those in Western Alaska salmon-dependent communities, must be addressed.

Response: The environmental justice analysis did provide separate descriptions of the relationships between different minority populations and the resources that might be impacted by this action. The goal of an environmental justice analysis is to identify "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." (E.O. 12898) Disproportion refers to impacts relative to impacts on the overall society. The analysis did not seek to compare low income and minority populations with one another to determine relative burdens, but it did seek to describe the potential for disproportionate impacts on each population to the extent available information permitted. NMFS is unaware of a source of information on median family incomes for non-resident pollock processing plant workers.

Comment 9-20: (9-24) The 2000 census data in Table 9.2 is old and outdated.

Response: An environmental justice analysis evaluates the potential for a federal agency to impose "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The starting point in this analysis is a threshold analysis to determine whether or not minority or low income populations occur in the action area. Section 9.3.2 provides this threshold analysis for the presence of low income populations. Table 9.2 provides information on labor force, employment status, unemployment, poverty and income for regional census districts and boroughs. The analysis uses 2000 census data and documents that low income populations are present in the area. The 2000 census data is sufficient for that purpose.

Comment 9-21: Section 9.4.8. on page 464, states that pollock allocations benefit member communities, they do not provide significant benefits to non-member communities. CDQ groups do benefit non-CDQ communities. For example, Coastal Villages Regional Fund (CVRF) provides a market to hundreds of salmon fishermen from Bethel and other non-member villages, paid for with BSAI pollock funds. More than 10 percent of the hundreds of jobs provided in CVRF's seafood plants are held by residents from non-CVRF member western Alaska villages and CVRF conducts regular employment recruitment in Bethel and in other communities outside our member communities. CVRF employs around 40 people at our administrative office in Anchorage, AK. CVRF generated/supports many indirect jobs as a result of our economic activity, such as flights throughout the region and hotels and meals in our regional hub of Bethel.

Response: NMFS agrees that CDQ revenues benefit non-member communities. Chapter 9 section 9.4.8 (page 464) indicates that non CDQ communities may be affected by management measures affecting CDQ entities. The relevant text reads: 'While CDQ pollock allocations benefit member communities, they do not provide significant benefits to non-member communities. There are many non-member communities that may be affected by this action. Communities on the mid to upper Yukon, and tributary rivers of the Yukon and communities above the lower fifty miles or so of the Kuskokwim are not members of CDQ entities. Most communities in Kotzebue Sound would not be included; however, communities in this area are dependent on chum and may not be greatly affected by an action to protect Chinook salmon. Residents of some of these communities may be affected indirectly to the extent that they can utilize CDQ entity investments in infrastructure or market building.' The section then summarized key information on the regional importance of CDQ entities, see Table 9-5 off the DEIS.

CDQ revenues benefit member communities and provide benefits to non-member communities. Although NMFS believes that the information in Chapter 9 section 9.4.8 of the DEIS is a good faith effort to provide decision-makers and the public with an evaluation whether the proposed alternatives will disproportionately affect low-income and minority populations, additional information about the CDQ Program's indirect benefits to non-CDQ communities will be included in the Final EIS. An expanded evaluation of CDQ revenue, benefits, and investments will be included in an appendix provided to the Council prior to final action on this measure in April 2009. This information includes the benefits described in the publicly available CDQ annual reports like, employment, educational opportunities, scholarships, and fisheries related markets.

Additionally, the Chapter 10 includes a section detailing the potential impacts of on fishery dependent communities that include both CDQ and non-CDQ members. Section 10.5.5.6 while not limited to nearshore fisheries the nature of impacts due to the closure of the pollock fishery under a hard cap or closure of an area under a triggered closure could reduced employment and business opportunities, especially in community with significant in investment in onshore processing. The impacts include the destabilization of rural communities, loss in economic and social welfare, and decline in quality of life for all rural resident in the region.

Chapter 10 comments

These comments are on Chapter 10; potentially affected salmon fisheries, economic benefits of Chinook salmon savings, and pollock industry revenue and cost effects.

Comment 10-1: The DEIS fails to meet even the minimum standards of adequacy for economic analysis.

Response: The RIR is mandated by Executive Order 12866 (E.O.12866), which states, in relevant part:

> In deciding whether and how to regulate, agencies should assess **all** costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach. [emphasis added]

NMFS acknowledges that the use of potentially forgone first wholesale gross revenues is not an ideal reflection of the expected economic costs (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in Chinook bycatch management. An explanation of the reasons for adopting this analytical approach is summarized in response to comment 10-83 and is included here by reference.

In order to estimate "profits", one must have data on costs, not simply revenues. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. These gross receipts may, of course, not be, in any meaningful way, indicative of realized net revenues, but by default serve as the best available "proxy" for economic earnings in these fisheries.

It must also be noted that "maximizing profit" is only one, among several possible motivating factors that may be "assumed" to define the objectives of a business enterprise.

Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration. And, further, this explains the very extensive reliance upon, and systematic treatment of, "qualitative" cost and benefit analysis, reflected in the RIR, as required under E.O.12866.

Comment 10-2: Unfortunately, the quality and comprehensiveness of the economic impacts analysis included in the DEIS are on a par with the welfare analysis in the DEIS. That is to say, they are simply omitted. No changes in employment or economic impacts are provided for any of the alternatives for any of the locations in Alaska or Seattle that are likely to be affected. No changes in employment or

investment values are provided for any of the CDQ groups in western Alaska that have substantial ownership investments and gain employment opportunities in the pollock fishery (e.g., see Coastal Villages Regional Fund 2008, p.24). No changes in economic activity are estimated or presented for any of the commercial salmon fisheries that are likely to be affected by reduced salmon bycatch in the pollock fishery.

Response: The comment misinterprets the numerical estimates of "potentially forgone gross revenues" and "gross revenues at risk", identified in the RIR. As explained therein, these gross estimates reflect highly simplified assumptions about the outcome of competing alternative bycatch rules. In a sense, they are intended to portray the "worst case" outcome if the pollock fishery was required to forgo a specific catch amount in response to each of the Chinook bycatch prohibition actions being examined. As the text clearly indicates, there is no expectation that this outcome will be realized as a result of any of the proposed Chinook bycatch management measures under consideration.

The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states "As noted above, gross revenues at risk are forgone *only* if a fishing fleet is unable to modify its operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere ..." The analysis goes on to address the expected results of less extreme catch reduction levels, resulting from industry changes in operational practices (e.g., gear changes, location changes, timing changes). In every case, the RIR emphasizes that these estimates are incomplete, owing to the absence of industry cost and operational data, market information, pricing structure, etc. As "gross revenue" measures, these numerical results cannot even be interpreted as being indicative of the net impacts the industry could be expected to incur as a result of implementation of any one of the several bycatch alternatives.

In addition, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as potentially forgone revenue or revenue at risk, depending on alternative. The RIR does not identify these impact estimates as lost revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Furthermore, the Council's stated preliminary preferred alternative modifies the strict hard cap formulations contained in Alternative 2 by including provisions for an industry managed Intercooperative Agreement (ICA provision) to reduce Chinook salmon bycatch to levels below the strict hard cap via industry derived incentives. Clearly, the Council's intent is to incentivize Chinook salmon bycatch avoidance in order to reduce it and the hard cap used in the potentially forgone revenue analysis is one part of the incentive. The implication is that the pollock industry will change behavior so that they do not face all of the potential forgone revenue, and/or revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration.

Analysis of potential employment effects is problematic for several reasons. First, employment data for pollock harvesting sectors is not systematically collected. Thus, it is not possible, with presently

available data, to equate potentially forgone revenue estimates with employment impacts. Second, there is no systematic data collection underway to document shoreside expenditures in the support sectors. Thus, it is not possible to equate estimated potentially forgone revenue with shoreside expenditures and subsequent effects on the services and support sectors. Third, employment in shoreside plants, though estimated by ADOL and reported in the RIR (page 499) is not reported specifically for pollock processing operations. Thus, it is difficult to determine the level of employment effects that might occur from potential contraction of the pollock fishery.

Furthermore, NMFS disagrees that the RIR has not addressed the adverse impacts that may accrue to CDQ communities, although those impacts could have been more effectively presented. NMFS will revise the presentation of impacts on communities, including explicit treatment of CDQ communities, in the subsequent draft document.

Finally, available genetic information does not allow estimation of AEQ Chinook salmon savings at the natal stream level of resolution. Thus, presently available scientific information does not allow estimation of potential increases in escapement or of potential numbers of Chinook salmon that may be made available for harvest in subsistence, commercial, sport, or personal use fisheries. As a result, it is not possible to estimate effects on subsistence food supply, commercial harvest and associated revenue, or sport and personal use catches. It is likewise not possible to estimate effects on fishing opportunities that may occur.

Comment 10-3: The issue is not a matter of accepting a hard cap; we can see the pressure on the Council to take that step and know that it is a likely action that our member companies must prepare for. The real issue is what can be expected to result from a hard cap set at an arbitrary level. The analysis predicts some of the potential costs and benefits. The predicted costs, while sorely underestimated, are enormous and would include the loss of thousands of jobs. The estimated benefits are not measurably predictable.

Response: NMFS disagrees with the assertion that the hard caps defined in the alternative set, including the preferred alternative, are arbitrary. The Council has put forward for analysis an alternative set that encompasses historic Chinook salmon bycatch levels in the pollock fishery. The alternative set includes provisions for sector level allocations, again based on several possible metrics of historic bycatch levels in the pollock fishery. The combinations of these options exceed several hundred in number and the analysis contained in the DEIS has considered a subset of those combinations in order to provide tractable range estimates of potential impacts. This analysis provides the Council with needed information to make an informed choice regarding a practicable level of Chinook salmon bycatch.

In addition, the comment misinterprets the numerical estimates of "potentially forgone gross revenues" and "gross revenues at risk", identified in the RIR. As explained therein, these gross estimates reflect highly simplified assumptions about the outcome of competing alternative bycatch rules. In a sense, they are intended to portray the "worst case" outcome if the pollock fishery was required to forgo a specific catch amount in response to each of the Chinook bycatch prohibition actions being examined. As the text clearly indicates, there is no expectation that this outcome will be realized as a result of any of the proposed Chinook bycatch management measures under consideration. The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states "As noted above, gross revenues at risk are forgone *only* if a fishing fleet is unable to modify its operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere ..." The analysis goes on to address the expected results of less extreme catch reduction levels, resulting from industry changes in operational practices (e.g., gear changes, location changes,

timing changes). In every case, the RIR emphasizes that these estimates are incomplete, owing to the absence of industry cost and operational data, market information, pricing structure, etc. As "gross revenue" measures, these numerical results cannot even be interpreted as being indicative of the net impacts the industry could be expected to incur as a result of implementation of any one of the several bycatch alternatives.

Regarding the benefits that may accrue from the proposed action, NMFS agrees that is only able to assert that the bycatch of Chinook salmon in the pollock fishery 'may' be affecting stocks of western Alaska Chinook and associated subsistence, commercial, and sport fisheries. Our knowledge of these complex ecological, biological, and economic relationships remains incomplete at this time. That being said, these data deficiencies do not remove the Agency's obligation to use the "best available scientific information" to evaluate, in this case, Chinook bycatch reduction alternative actions in the BSAI pollock fisheries.

Comment 10-4: The choice of time period (2003 through 2007) for the cost/benefit analysis is inappropriate and should be increased to more accurately represent historical bycatch, rather than the highest five years. In addition, the revenue at risk should be viewed as an upper bound. While this is noted in a footnote (pg 653), this analytical problem should be addressed quantitatively as well by providing revenue at risk with a set percent reduction in historical levels to account for the behavioral change a hard cap will produce; for example, a 20% bycatch reduction could be applied across the board to account for reductions from using salmon excluder devices, which would likely become more prominent under a hard cap.

Response: The Council has chosen to consider the proposed action because of recent high numbers of Chinook salmon taken as bycatch in the Bering Sea pollock fishery. The analytical timeframe was chosen because it represents the most recent 5 year time period and is most reflective of recent fishing patterns (DEIS section 3.2, page 108). Those status quo conditions include observed high levels of Chinook salmon bycatch under present regulations that provide an exemption to Chinook salmon savings area closures for operators that participate in the VRHS. The analytical period encompasses years when the VRHS was in place, either via industry initiative, via an experimental fishery, or as a formal program under present regulations. Including data prior to 2003 would not be representative of current bycatch levels, of current regulations, or of current efforts by industry to avoid bycatch.

In addition, in 2003 NMFS implemented the current catch accounting system known as e-landings. Thus, the period of 2003 thorough 2007 is covered by e-landings data. Prior to 2003, a "blend" system was used and differs from the present methodology. These data represents the most consistent and uniform data set available on a sector-specific basis for analysis. Thus, for data consistency, accuracy, and to meet the agency's obligation to use the "best scientific information," the analytical period of 2003-2007 was chosen and NMFS asserts that it is the appropriate analytical period.

In a sense, "revenue at risk" is an upper bound estimate in that it is, by definition, an estimate of the revenue that is put "at risk" by a spatial closure. It is placed at risk, as opposed to being "lost" because the analysis assumes that industry will try to mitigate the risk by relocating effort to immediately adjacent open areas. As such, "revenue at risk is a worst case scenario of what may occur if industry does not change harvesting behavior to attempt to mitigate the effects of a spatial closure. Applying a flat 20% reduction in bycatch is not part of the current alternative set and would be arbitrary. Further, salmon excluder devices are in experimental stage of development and it is not at presently clear how effective they will be, how may vessel operators will voluntarily use them, and what average reduction in bycatch might be brought about via their use.

Comments on CDQ issues

Comment 10-5: A hard cap could inflict far more economic pain in western Alaska than economic gain. The DEIS suggests that western Alaska communities will receive very little benefit as a result of the Chinook caps in the Bering Sea pollock fishery. The return of an estimated 9,710 Chinook salmon to the Kuskokwim river and 14,938 Chinook salmon to the Yukon river under the lowest Alternative 2 cap of 29,300 Chinook salmon would have little or no discernible benefit in either subsistence or local commercial fisheries but could have a crippling effect on the tens of millions of dollars entering the economy each year from the BSAI pollock fishery.

Response: Comment acknowledged.

Comment 10-6: The statement on page 498 that "less than 1% of the Bering Sea catch is harvested by vessels owned by Alaska residents" and that this percentage has "remained stable since 2002..." is inaccurate. The CDQ groups are heavily invested in the Bering Sea pollock fishery, the pollock fishery in particular The level of investments that the CDQ groups have made in the Bering Sea pollock fishery has increased significantly in recent years. One commenter noted that the CDQ groups own approximately 33% other at-sea pollock processing fleet and that this fleet, when CDQ catch is included, harvests nearly 50% of the Bering Sea pollock quota each year. CDQ groups also have ownership interests in at least one mothership (the MS Golden Alaska), and in numerous pollock catcher vessel. Another commenter noted that a thorough review of Alaskan and CDQ investment in the pollock industry would show that Alaskans have more than a 30% stake in this fishery. The DEIS should be revised to include accurate information about the Alaskan ownership of pollock vessels by the CDQ groups.

Response: NMFS agrees that the statement on page 498 is incorrect. This deficiency was noted by the Council at its June meeting and analysts were requested to include more information about CDQ entity ownership of the Bering Sea pollock fleet. Analysts provided that information in the DEIS in Section 9. and Table 9-5 on pages 464. However, analysts failed to remove the inaccurate statement on page 498. That statement will be removed in the final EIS.

Although NMFS acknowledges that CDQ entities have investments in BSAI fisheries, it is difficult for NMFS to confirm the figures given for investments in the BSAI pollock fishery. CDQ investments by species or group have not been supplied to NMFS since 2005. As mandated by the 2006 reauthorization Magnuson Stevens Act, NMFS is no longer authorized to request this type of data. NNFS also acknowledge that the analysis would benefit from this information but notes that the Council will have the best available information on CDQ investments and community benefits when they take action in April of 2009 (see the attached CDQ appendix).

Additional information that would improve the analysis of the impacts of the alternative would be to estimate the forgone values of pollock royalties to the individual CDQ entities under each alternative. This analysis is included in the CDQ appendix and will be added to the Final EIS if that information becomes available.

Comment 10-7: None of the alternatives appear to give the CDQ Program a fair pro rata share of the Chinook salmon bycatch allocations. These alternatives penalize the CDQ group's "clean" fishing history and may also violate the CDQ requirements in the MSA. Section 305(i) (1)(B)(iv) of the MSA requires that harvest of CDQ allocations for species with fishing cooperatives, as exist under the AFA, shall be

regulated no more restrictively than for other participants in the applicable sector, including with respect to the harvest of non-target species.

Response: Alternative 2, component 2, option 1 would allocate the same percentage of the Chinook salmon hard cap to each sector as the percentage allocation of pollock that sector receives under the American Fisheries Act. Therefore, this alternative does provide the Council the option of allocating among the sectors a pro rata share of Chinook salmon equal to the sector's pollock allocations.

NMFS does not agree that any of the alternatives in the DEIS would be inconsistent with the CDQ regulation of harvest provision of section 305(i) (1)(B)(iv) of the MSA. Each of the alternatives and options analyzed appears to apply the same type of Chinook salmon management measures to the CDQ Program and its allocations of Chinook salmon bycatch as would be applied to the other pollock sectors.

It would be difficult to confirm the statement that the CDQ entities have fished more cleanly, or have harvested pollock with lower salmon bycatch rates than the other sectors because operators of vessels harvesting both CDQ and non-CDQ pollock on the same fishing trip have the option of assigning a haul of pollock to either the CDQ entity's quota or to the vessels quota after the crew assesses the bycatch in that haul. NMFS regulations allow up to 2 hours after the fishing gear is retrieved to record the assignment of the haul in the vessel's logbook. Historically, because the CDQ entities were constrained by multiple hard caps for other groundfish species and prohibited species and the non-CDQ pollock fisheries were not, some CDQ entities would request that the vessel operators assign the lower bycatch hauls to the CDQ entity and the higher bycatch hauls to the non-CDQ pollock fisheries. This would result in it appearing that the CDQ entities were fishing with lower bycatch rates than the non-CDQ pollock fisheries.

Comment 10-8: The DEIS fails to incorporate up-to-date and accurate descriptive information regarding the investments of CDQ groups in the BSAI pollock fishery and the benefits to CDQ and non-CDQ communities derived from these investments. CDQ groups are well vested in the BSAI pollock fishery and own 30-40% of the companies involved in the fishery. CDQ entities accrue tens of millions of dollars per year from their investments in the pollock catcher processor fleet in addition to the royalties they derive from leasing their CDQ allocations. This revenue makes it possible for the CDQ groups to invest in local communities. The DEIS fails to account for the benefits of jobs, wages, near shore fishery opportunities, scholarships, and other significant economic development activities in Western Alaska communities that are funded almost entirely by the BSAI pollock fishery.

Response: NMFS recognizes the need to update and augment the CDQ information in the DEIS. Following a literature review of publicly available information on CDQ investments and community benefits, NMFS has consolidated existing CDQ background information from Chapter 3 section 3.4.4.2 (page 153) and Chapter 9 section 9.4.8 (page 462) of the DEIS into a new section of the FEIS. This new section incorporates the best available information regarding vessel ownership (Discussion in comment 10-6 relevant), royalty and investment revenue generated for CDQ entities by the BSAI pollock fishery, and community benefits such as jobs, wages, near shore fishery investments, scholarships, and other significant economic development activities.

Until 2006, NMFS received detailed annual financial audits from each CDQ entity (for 2005 and previous years). The audits included detailed revenue information and royalties paid, by species or species group, for the CDQ allocations. NMFS has not been authorized to require financial audits since the 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act. Therefore, we now rely on information from the CDQ entities publically available annual reports prepared primarily for

residents of the member communities. Some of the CDQ entities choose to include specific information on revenue sources and investments, while others choose not to provide this level of detail in their annual reports.

The Council will have this information attached to the DEIS Comment Analysis and Response, in addition NMFS will present new information to the Council at the Council meeting March 30th to April 7th in Anchorage. Thus, the Council will have up-to-date and accurate descriptive information prior to taking final action on Chinook salmon bycatch in April 2009.

Comment 10-9: Several commenters made specific suggestions for improving the descriptive information about CDQ entities in the final EIS:

- Page 154, section 3.4.4.2, that states "CDQ groups had a total of $134 million in revenue in 2005, earned primarily from pollock royalties" is misleading and incorrect.

- CDQ interests own approximately 33% other at-sea (CP) pollock processing fleet-a fleet that, when CDQ catch is included, harvests nearly 50% of the Bering Sea pollock quota each year. CDQ groups also have ownership interests in at least one mothership (the MS GOLDEN ALASKA), and in numerous pollock catcher vessels.

- The CVS Goodnews Bay/Platinum operation is the largest investments in CDQ history at over $35 million. Over 600 permit holders delivered 412,000 pounds of halibut and 2.8 million pounds of salmon to CVS facilitates in 2007. Western Alaska CDQ groups have invested in the pollock industry and have approximately 40% ownership in companies involved with this fishery.

- Add relevant information on CDQ investments in the BSAI pollock fishery and other pollock sectors to tables to the Executive Summary in the sections on the Bering Sea pollock fishery and the costs of forgone harvest in the pollock fishery, and tables ES-20, 21, and 22.

Response: NMFS acknowledges these comments. NMFS has consolidated existing CDQ background information from Chapter 3 section 3.4.4.2 (page 153) and Chapter 9 section 9.4.8 (page 462) of the DEIS into a new section for the FEIS. Final EIS will include up-to-date and accurate information in the sections indicated in the public comments. Specific revisions and the expanded CDQ section are attached as Appendix 11.

Comment 10-10: In western Alaska the CDQ Program provides significant (85%) funding to support salmon related infrastructure including processing plants, fishery support centers, and fishing vessels that benefit both CDQ and non-CDQ members. CDQ revenue largely derives from the BSAI pollock fishery; therefore, any measure limiting the pollock fishery could impact salmon fishermen.

Response: The DEIS does provide background information on the CDQ program's investment revenue and investments in fishery related infrastructure for salmon and other near shore species fisheries in Chapter 3 section 3.4.4.2 (page 153), Chapter 9 section 9.4.8 (page 462) and Chapter 10 section 10.5.2 (page 705). In response to comments received during the DEIS comment period, NMFS has conducted a literature review of publicly available information about the investments, royalties, and benefits to communities benefits associated with the CDQ entities. This new information includes hypothetical forgone pollock royalty revenue tables and CDQ investments such as processing plants, fishery support centers, scholarships, and vocational training.

It is difficult for NMFS to confirm the estimate provided by the constituent. Until 2006, NMFS received detailed annual financial audits from each CDQ entity. The audits included detailed revenue information and royalties paid, by species or species group, for the CDQ allocations. NMFS has not been authorized to require financial audits since the 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act. Therefore, we now rely on information from the CDQ entities publically available annual reports prepared primarily for residents of the member communities. Some of the CDQ entities choose to include specific information on revenue sources and investments, while others choose not to provide this level of detail in their annual reports.

Comment 10-11: For many residents of CDQ communities, the opportunities from the CDQ program are an alternative to subsistence. Adoption of restrictions on the pollock fishery of the magnitude under consideration threaten that alternative. Rather than helping subsistence fishermen, Alternatives 2-4 may create subsistence fishermen. The DEIS emphasizes the importance of subsistence harvests, but the DEIS ignores the fact that the CDQ program provides an alternative to subsistence dependency for many people in CDQ communities, an alternative threatened by the proposed restrictions on the pollock fishery. In something of an understatement, the DEIS concedes that "[a]nything that tends to diminish economic activity in these communities ... can do disproportionate harm...." Id. at 706. Nevertheless, the DEIS conducts no analysis of, and fails to account for, these acknowledged harms that will flow from restrictions on the pollock fishery.

Response: NMFS acknowledges this comment. See Response for comment 10-10 for a relevant discussion.

Comment 10-12: CDQ communities derive tens of millions of dollars per year from revenue derived from the BSAI pollock fishery. These investments are at risk under some of the Chinook salmon bycatch measures under consideration. Funding for CDQ projects could be severely impacted. The failure of the DEIS to evaluate these impacts on the "economic engine" driving the development of opportunities in CDQ and non-CDQ communities is a major flaw in the document, making it inadequate in its role in "informed decision making".

Response: Revisions to this analysis take into account pollock revenue and community investments of CDQ entities. Analysis has been expanded drawing from the publicly available annual reports and a recently released economic report. NMFS has consolidated existing CDQ community investment information from Chapter 3 section 3.4.4.2 (page 153) and Chapter 9 section 9.4.8 (page 462) of the DEIS into a new section of the FEIS. To better inform the public and decision makers this section incorporates the best available information regarding vessel ownership, revenue generated by investments in the BSAI pollock fishery, and community benefits such as jobs, wages, near shore fishery investments, scholarships, and other significant economic development activities. Chapter 10 section 10.5.2 (page 652) and Chapter 10 section 10.5.6 (page 706) of the DEIS address the impacts of hard caps and reduced pollock landings on fishery dependent communities including CDQ entities and other entities well vested in onshore processing. The discussion in comment 10-6 may also be relevant.

Comment 10-13: Section 9.4.8, states that CDQ groups have invested in inshore processing plants for salmon and halibut. This section does not mention that these operations are fully subsidized by the pollock fishery. This section also incorrectly states that CVRF made loans to two aluminum welding businesses for boat repair and buildings in Eek and Hooper Bay. The CVS is completing the construction of a $35 million salmon processing facility in Goodnews Bay/Platinum operation is the largest investments in CDQ history at over $35 million. Over 600 permit holders delivered 412,000 pounds of halibut and 2.8 million pounds of salmon to CVS facilitates, including the Quinhagak plant, in 2007.

CVRF planned, constructed, and operates a total of 14 Fisheries Support Centers in the communities of Scammon Bay, Hooper Bay, Chevak, Tununak, Toksook Bay, Nightmute, Mekoryuk, Chefonak, Kwigillingok, Kongiganak, Napakiak, Napaskiak, Eek, and Goodnews Bay. In addition CVRF operates six halibut plants in the region. Annually, CVRF employs approximately 340 workers at 7 processing plants in the region, with an additional 120 expected with the opening of the Goodnews Bay/Platinum salmon plant. All of these benefits were paid for with earnings from the BSAI pollock fishery. The 2007 WACDA report includes more detailed data on the CDQ investments and benefits.

Response: Revisions to CDQ background information take into account CVRF's comments. The existing background information on the CDQ entities can be found in Chapter 3 section 3.4.4.2 (page 153) and Chapter 9 section 9.4.8 (page 462) of the DEIS. Sections 10.5.2 and 10.5.5.6 of the DEIS include information about the impacts of hard caps and reduced pollock landings on fishery dependent communities including CDQ entities and other entities well vested in onshore processing. The Final Environmental Impact Statement will describe the importance of revenue derived from the BSAI pollock fishery to regional benefits. The Council will have this information prior to taking final action in April of 2009. The discussion in comment 10-08 may also be relevant.

Comments on the importance of Chinook salmon

Comment 10-14: One of the major categories of benefits the DEIS cites as justifying restrictions on the pollock fleet is "passive use (or non-use) benefits." DEIS at 625. There are multiple conceptual and analytical defects in relying on non-use values to justify restricting the pollock fleet. The DEIS defines "passive (or non-use)" values as the value of knowing that the resource exists "and will continue to exist in perpetuity." DEIS at 627. The General Accountability Office defines nonuse values as the "pleasure of knowing that the resource exists." General Accounting Office, Natural Resource Damages of the Department of Energy, GAO/RCED-96-260R, August 16,1996, at 19. In short, passive use values are the psychological value of knowing that the resource exists. However, the DEIS offers no proof that such values exist as to Chinook salmon specifically and, if they exist as to Chinook, that they are damaged, and if they are damaged, by how much. Nevertheless, the DEIS concludes, without analysis, evidence, or support, that non-use values can be used to justify bycatch restrictions. Such "analysis" does not comply with NEPA.

Response: The comment pertains specifically to section 10.5.1.1. This discussion of passive-use values is an element of the RIR. The RIR is mandated by Executive Order 12866 (E.O.12866), which states, in relevant part:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

As the E.O. passage specifies, all costs and all benefits must be included in a regulatory impact analysis, not only those that are market-based and/or readily amendable to monetization. In point of fact, passive-use values are not, as the commenter suggests, "psychological", but instead reflect economic value (in the

classic sense of that term) held by individuals. While the estimation of these values is challenging, there is no serious dispute that passive-use values are real measures of human welfare (i.e., utility), which is the foundation of microeconomic science. Attribution of passive-use value(s) has been adopted and widely employed in the field of natural resource management; empirical estimation techniques have been endorsed for use by NOAA's Blue Ribbon Panel (ca.,1990); and the use of these techniques and resulting passive-use estimates sanctioned by the U.S. Federal Courts.

To the assertion by the commenter that the analysis "offers no proof that such values exist as to Chinook salmon...", NMFS points to the significant expression of public interest and concern, especially by non-commercial fishing interests, in the matter of Chinook (and chum) salmon bycatch. While several examples can be readily cited, perhaps the most unambiguous of these is the extraordinary cultural and social value held for Chinook salmon, by many American Native peoples (and non-natives, alike). Documentation of these Chinook salmon values are reflected in treaty agreements, both between Native American Tribal entities and the U.S. government, as well as internationally (e.g., numerous U.S.-Canada, historically, U.S.-Japan-U.S.S.R. salmon treaties).

Finally, a careful reading of the 10.5.1.1 passages, cited by the commenter, does not suggest, as asserted, that "non-use values justify restricting the pollock fleet." Instead, section 10.5.1.1 merely observes that changes in Chinook salmon bycatch will likely result in a wide range of human welfare impacts and, among these, are welfare changes attributable to those who hold passive-use (or non-use, existence, bequest, etc.) value for this species. NMFS believes this is a reasonable, fully justified, and wholly supported conclusion and, notes further, in full compliance with E.O.12866 requirements.

Comment 10-15: The first fundamental problem with relying on existence values to justify restricting the pollock fishery is that there is no threat to the existence of the Chinook salmon resource caused by the pollock fishery. One searches the DEIS in vain for any claim, let alone proof, that the incidental take of Chinook salmon in the pollock fishery threatens the existence of that species. Any psychological existence values that are alleged to exist are satisfied if the resource exists.

Response: This comment reflects a misunderstanding of the meaning of "existence value". Perhaps use of an alternative, but equivalent term, "passive-use value", will resolve the confusion. Fundamentally, passive-use value reflects the utility an individual derives from knowing that the resource of interest (e.g., Chinook salmon) exists in a given state of being, even though no use is ever expected to be made of it by the holder of the value. Such values are not, in any way, correlated with the risk of "extinction", as implied by the commenter. Indeed, the "source" of the passive-use value need not even be a living thing (i.e., the earliest work on passive-use described values placed on free flowing rivers by individuals who reported no intention of ever visiting these rivers). Passive-use values are actual, measurable, and legitimate aspects of society's preferences for, in this case, fishery resource management. As such, passive-use values must be accounted for, to the extent practicable, in evaluating the benefits and costs of the proposed Chinook bycatch action. Along with the other sources of "benefits" and "costs", passive-use values contribute to a full accounting of the net benefit to the Nation (possibly negative) accruing from the tradeoff of Chinook bycatch for pollock harvests in the BSAI. This is a requirement of Presidential Executive Order 12866.

Comment 10-16: The second fundamental problem with relying on existence non-use values to justify restrictions on the pollock fishery is that people generally do not place an existence value on Chinook salmon per se. The DEIS admits that "few" people who attribute existence values to marine resources "would likely be able to either explicitly recognize or express" such values for the living marine resources of the Bering Sea. DEIS at 628. If people are unable to "express," or even recognize, non-use values for

the living marine resources of the Bering Sea, how can there be an identifiable and distinct existence value for just one species of salmon? The DEIS admits this analytical defect when it states that "isolating a passive-use value unique to Chinook salmon taken in the Bering Sea ... presents conceptual problems." Id. The DEIS states that salmon has a cultural existence value to the Native peoples of Alaska. Id. at 627. No one disputes, diminishes, or disrespects the cultural values of Alaska's Native Americans. The problem is that the DEIS contains not one shred of evidence that the Chinook salmon bycatch in the pollock fishery prevents Native peoples from harvesting sufficient Chinook salmon to meet their cultural needs.

Response: The commenter appears to misunderstand the concept of "passive-use" (e.g., as most clearly reflected in the final sentence of the comment). Passive-use values (or, existence values, or non-use values) exist completely independent of, and in addition to, "use-values". Therefore, whether (as the comment asserts) "... the Chinook salmon bycatch in the pollock fishery prevents Native peoples from harvesting sufficient Chinook salmon to meet their cultural needs", is completely irrelevant to the existence, size, and source of non-use values. Furthermore, whether "few" or many people are able to express or even identify attributable non-use values for Chinook salmon taken as bycatch in the pollock trawl fishery is an empirical question, still open to exploration. As such, NMFS has not sought to characterize the size or scope of such non-use values, only identify their probable existence within the context of the proposed Chinook bycatch reduction action. To do the former might bias the assessment. To fail to do the latter would result in an incomplete and technically deficient RIR, based upon the requirements of E.O.12866.

Comment 10-17: Compounding the fundamental analytical defects in the non-use values analysis is the statement in the DEIS that non-use values are measured by contingent valuation methodology ("CVM") and that CVM has been "carefully reviewed and accepted (when employed appropriately) by the federal courts." DEIS at 627, citing Ohio v. United States Department of the Interior, 880 F.2d 432 (D.C. Cir. 1989). The argument appears to be that non-use values must exist as to Chinook salmon because the courts have said CVM is a way to measure non-use values. Such logic begs the question of whether non-use values actually exist as to Chinook salmon. In fact, the DEIS admits there has been no study of non-use values for Chinook salmon and, therefore, non-use values "cannot be further analyzed." Id. at 628.

Even if a CVM study were undertaken, there would be serious doubts about the results. The DEIS, after admitting that the Ohio court found CVM a valid procedure only "when employed appropriately," neglects to mention that no court reviewing a CVM study has found it was employed appropriately. In the only two court cases flowing from the Ohio decision where CVM was employed as a separate basis for damage claims, the courts rejected the results because the CVM analysis produced such unrealistic valuations.

Response: To the extent this commenter argues that contingent valuation method is generally inappropriate, NMFS disagrees but notes that it did not conduct a CVM analysis in this DEIS. The section in the DEIS on Passive-Use Benefits concludes:

> Therefore, at present, it is not possible to provide a specific monetary estimate of the passive-use value that is hypothesized to be associated with one or another of the proposed salmon bycatch minimization alternatives or, therefore, to differentiate passive use benefits by alternative. Thus, while this analysis recognizes their existence, passive use benefits cannot be further analyzed. DEIS at 628.

Because monetary estimates of passive uses cannot yet be derived, NMFS has assiduously avoided any suggestion of the potential magnitude of non-use impacts, choosing instead only to identify their likely existence. This is fully consistent with requirements contained in E.O. 12866 and NOAA Fisheries Guidance for Preparation of Economic Impact Analyses.

To the extent that this commenter argues that the non-use values of Chinook salmon are zero, NMFS also disagrees. While the RIR notes that NMFS is not aware of passive-use value estimates specifically for Chinook salmon lost to pollock bycatch in the BSAI, there have been several peer reviewed analyses, employing a range of estimation techniques, directed at measuring the passive-use value of Chinook (as well as other species of salmonids). See, for example, Passive Use Values of Wild Salmon and Free-Flowing Rivers. Dr. John Loomis, Agricultural Enterprises Inc. October 4, 1999, and the accompanying references thereto. At: [http://www.nww.usace.army.mil/lsr/reports/misc_reports/passive.htm].

In short, while NMFS notes the likely existence of passive-use values for Chinook salmon, NMFS did not attempt to analyze what those values may be in the context of Chinook taken as bycatch in the pollock fishery since there is no existing information on that issue of which NMFS is aware.

Comments on correcting specific items

Comment 10-18: Table 10-59 (pg 632) is incorrect. The "windows" subsistence fishing schedule 26 has been in place since 2000 on the Yukon River. This schedule restricts subsistence fishing time throughout the Yukon. Commercial fisheries were greatly reduced from 2003-2007, with harvests well below historical averages. In 2007 the commercial harvest was 33,629 Chinook, 30 percent below the recent 10-year average. These same comments apply to the text on page 633.

Response: NMFS disagrees with the assertion that Table 10-59 (also Table ES-13) and the text on page 633 is incorrect. Regarding the Yukon River, Table 10-59 specifically states that some key escapement goals were not met but that additional management measures were not put in place during 2003-2007. The "windows" fishing schedule referenced in the comment is depicted in Table 10-32 and as the comment indicates, "has been in place since 2000 on the Yukon River." Thus, the RIR documents this schedule, clearly identifies how it was set for the 2008 season, and notes, in Table 10-59 that no additional management measures were put in place from 2003-2007. Further, the commenter is correct in citing the downward trend in commercial Chinook harvest on the Yukon River. The RIR documents this trend beginning on page 578 in the section covering Commercial Fishery Situation and Outlook.

In an attempt to clarify what was intended by the summary of potential management implications in table 10-59, a revised version is attached in Appendix 8. This table will replace Table 10-59 (and ES-13) in the Final EIS. Changes from the previous version include further clarification on the difference between escapement goals on the Yukon and Treaty passage goals with Canada (and resulting Canadian restrictions), clarification on more restrictive management measures in place prior to (and extending through) the time period being characterized in the analysis (Yukon and Kuskokwim), and specific measures in Norton Sound that were not specified in the previous draft of this table.

Comment 10-19: Correct the phrase "because subsistence enjoys a 'priority use' privilege . . ." used in the DEIS. ANILCA requires that non-wasteful subsistence uses of fish and wildlife resources shall be the priority consumptive use on the public lands of Alaska. Therefore, use of the words "privilege" and "enjoy" is a misrepresentation of the subsistence priority. These words should be deleted. The correct

phrase should be "because subsistence is the priority use, superseded only by escapement needs, under both Federal and State regulations. . ."

Response: Comment acknowledged, and the Final EIS will be amended accordingly to provide: "Because the taking on public lands of fish for non-wasteful subsistence uses is accorded priority over the taking on such lands of fish for other purposes, superseded mainly by escapement needs, Chinook salmon bycatch savings from better control and avoidance of Chinook salmon interceptions in the trawl fisheries could accrue to subsistence users."

Comment 10-20: Page 537, last paragraph: It is likely that the subsistence harvests in 2008 was lower than in 2007 because the 2008 Chinook return was the lowest on record. Reference page 2 of ADF&G's 2008 Norton Sound season summary at:
http://www.cf.adfg.state.ak.us/region3/finfish/salmon/catchval/08nssalsum.pdf.

Response: NMFS agrees that referenced run summary does indeed identify 2008 as the poorest Norton Sound Chinook salmon run on record. This information will be included in the FEIS.

Comment 10-21: Page 530, last paragraph: makes a reference to "...approximately 4,500 households residing in 38 communities in the region..." this is incorrect. An accurate accounting of communities and households throughout the affected AYK region needs to be included throughout the EIS.

Response: NMFS agrees that an accurate accounting of communities and households in the AYK region should be included in the analysis and will add the following information to the Final EIS and reorganize/consolidate, clarify, and update a section in Chapter 10 of the Final EIS to better address subsistence issues. According to ADF&G, the subsistence salmon harvests in the Arctic-Yukon-Kuskokwim region have cultural and practical significance to many of the approximately 120 communities, representing approximately 14,711 households and approximately 58,596 residents (in 2007) in the AYK region, in addition to the more than 57,000 residents in the Fairbanks North Star and Denali Boroughs, many of whom also depend upon AYK salmon stocks for dietary and other cultural needs. There are also Canadian residents who rely on AYK salmon stocks. A new section on subsistence is provided in Appendix 9. This information will be included in the Final EIS.

Comments on impacts to salmon users

Comment 10-22: S.E. Alaska communities are also impacted by bycatch in the BSAI pollock fishery. Communities like Sitka depend on the troll caught winter Chinook that are worth between 8 and 10 dollars per pound.

Response: NMFS acknowledges that some Chinook salmon taken as bycatch in the Bering Sea pollock fishery are of Southeast Alaska, British Columbia Canada, and Pacific Northwest origin. However; the available genetic data is not sufficient to attribute numbers of bycaught Chinook salmon to specific river systems or harvest fisheries. As a result, it is not possible to estimate impacts of past Chinook salmon bycatch, or potential benefits in terms of Chinook salmon that may be "saved" by the proposed action, on harvest fisheries by individual river systems in Southeast Alaska, British Columbia, or the Pacific Northwest. Instead, general trends may be inferred in aggregate for these regions.

Comment 10-23: The DEIS assumes there are benefits to the sport fisheries without conducting any analysis to determine if the facts support that assumption. If the DEIS had done the analysis, it would

have discovered there is no factual basis to support the assumption that sport fishermen will derive measurable benefits from restricting the pollock fishery. The facts do not justify the DEIS's assumption that Chinook salmon is a major contributor to in-river sport fisheries, let alone that these fisheries will derive measurable benefits from restrictions on the pollock fishery, particularly given the small numbers of AEQ salmon that would return to the rivers and other end uses of these fish.

Response: Based upon the best available scientific information, NMFS has asserted that the bycatch of Chinook salmon in the pollock fishery 'may' be affecting stocks of western Alaska Chinook and associated subsistence, commercial, and sport fisheries. Our knowledge of these complex ecological, biological, and economic relationships remains incomplete at this time. That being said, these data deficiencies do not remove NMFS's obligation to use the "best available scientific information" to evaluate, in this case, Chinook bycatch reduction alternative actions in the Bering Sea pollock fisheries, and their potential to benefit those with historical Chinook salmon allocation rights, including sport fishermen.

Comment 10-24: The importance of subsistence harvests, and the benefits of reductions in salmon bycatch are well characterized on page 531. This type of qualitative description accurately describes the potential impacts in a manner which many of the quantitative analyses miss and should be repeated and stressed throughout the analysis.

Response: NMFS appreciates the comment and based on this and other comments will revise the discussion on the subsistence harvest of Chinook salmon and the impacts to subsistence users.

" any substantial reduction in losses of salmon, but particularly Chinook salmon, would make a very significant contribution to the economic, social, cultural and quality of life of (in particular, but not exclusively) western Alaska's salmon subsistence users, families, villages and social communities."

Comment 10-25: Under any scenario Nome subsistence fishermen will be dealt a heavy blow to their lifestyle and all of western Alaska will carry the entire burden of NMFS management.

Response: NMFS acknowledges the comment.

Comment 10-26: The DEIS does not sufficiently discuss the potential economic impacts to coastal communities. The contribution of the pollock industry to the declining salmon runs in western Alaska is not sufficiently analyzed. While there is a lack of data on certain topics such as determining the river of origin for each bycaught fish, this information is vital to assessing impacts to coastal communities reliant on subsistence harvests. This is particularly important because declining salmon returns have already had impacts on coastal communities. If anything, this lack of data should make NMFS extremely conservative when it comes to assessing allowable bycatch, which is not the case with this EIS.

Response: With regard to the comment that the DEIS does not sufficiently discuss the potential economic impacts to coastal communities, NMFS cannot provide community-level impact analysis for this action, due to the inability to directly link Chinook salmon bycatch with in-river runs of Chinook in any particular community. Chapter 10 uses the best available information, which is provided and presented by region (Section 10.3). This section provides extensive background information on the subsistence (and commercial and recreational) Chinook salmon fisheries in western Alaska river systems likely most affected by Chinook salmon bycatch. The regions are based on the ADF&G management areas (Kotzebue, Norton Sound, Kuskokwim River/Bay, Yukon, and Bristol Bay).

Section 10.5.1.3 (p. 631) states that it is not possible with presently available information to determine the proportions of river-specific AEQ estimates of returning adult Chinook salmon that would be caught in subsistence fisheries (or commercial or recreational fisheries) in the various river systems of western Alaska, and further, in any particular community, under the proposed range of alternatives.

The analysis relies on a discussion of subsistence use and AEQ estimates of Chinook salmon saved, with a particular focus on river systems in western Alaska, given the ability to resolve some of those river systems singularly. The estimates of Chinook salmon saved are used as the measure of economic benefits of the alternatives and options. While not possible to resolve on a community level, the analysis states that it is reasonable to assume that any additional Chinook salmon (i.e., 'salmon saved') would benefit escapement and harvest to the identified river systems, and the communities located and/or dependent upon those river systems.

The comment notes the need to assess impacts on coastal communities specifically reliant on subsistence harvests. While NMFS is limited to a regional assessment of potential impacts to subsistence users, NMFS agrees that the analysis should further emphasize the significance of subsistence harvests and attempt to identify those communities that have had historical Chinook salmon subsistence harvests. Chapter 9, Section 9.4.2 describes subsistence harvests of Chinook salmon, and Chapter 10, Section 10.3 provides detailed descriptions of regional subsistence, commercial, and recreational salmon fisheries throughout western Alaska. Subsistence uses of wild resources are defined in Alaska state law as 'noncommercial, customary, and traditional uses' for a variety of purposes, including: direct personal or family consumption; for the making and selling of handicraft articles out of nonedible byproducts of resources; and for the customary trade, barter, or sharing for personal or family consumption. It is a complex system that is tied to Alaska Native peoples food, traditions, and culture, and typically involves the community, not just the individual fisherman. NMFS will reorganize/consolidate, clarify and update a section in Chapter 10 of the Final EIS to better address subsistence issues. A draft of a new subsistence section is included in Appendix 9.

In addition, shoreside processing sector revenue impacts are estimated in the RIR, embedded within the overall shoreside sector impacts. This is because the price used to estimate impacts on the shoreside sector is inclusive of all value added processing, at shoreside plants, to the first wholesale level. It is important to note that the analysis does include shoreside processing impacts, just not at the port or community level. Confidentiality prevents taking the shoreside impacts to the port or community level.

Comment 10-27: The DEIS does address the costs of forgone harvest in the pollock fishery but makes no assessment of the costs of forgone subsistence salmon harvests. Unfortunately, the DEIS seems to disproportionately focus on the practicability of bycatch as it relates to the pollock sector. Communities such as Unalakleet have, at various times, forgone subsistence salmon fishing in order to help conserve stocks in the hope of increasing future returns. This is necessary due, in part, to the high incidence of bycatch in the pollock fishery which intercepts Chinook and other salmon prior to them reaching subsistence fishing grounds. There is no such thing as "surplus" fish that can be sacrificed for bycatch because every fish that returns to our rivers is important for meeting our subsistence needs and continuing our traditional way of life. The issue of practicability of bycatch levels becomes much more acute when considering the economic conditions of the remote Alaska communities with comparatively limited food and economic resources.

Response: Chapter 10 discusses the difficulties in estimating the costs of forgone subsistence salmon harvests, and the reasons why this assessment was not made. Section 10.5.1 states that the AEQ estimates represent the potential benefit in numbers of adult Chinook salmon that would have returned to individual

river systems and aggregate river systems as applicable over the years from 2003 to 2007. These benefits would accrue within natal river systems of stock origin as returning adult fish that may return to spawn or be caught in either commercial, subsistence, or sport fisheries.

Exactly how those fish would be used (i.e., in what fishery would they have been caught; whether they would have returned to spawn, etc.) is the fundamental, and very difficult, question to answer in order to provide a balanced treatment of costs and benefits. Measuring the potential economic benefit of Chinook salmon saved, in terms of effects on specific subsistence, commercial, sport, and personal use fisheries is problematic. The proportion of AEQ estimated salmon that might be taken in each of the various fisheries is a function of many variables, as discussed in Section 10.5.1. Lacking estimates of the proportion of AEQ Chinook salmon that would be caught by each user group, it is not possible to estimate economic benefits in terms of gross revenues or other monetary values for those user groups due to changes in AEQ Chinook salmon under each alternative.

Further, the total social and cultural value of subsistence Chinook salmon catch cannot be evaluated in a way that is directly comparable to the monetary value of potential increases in commercial Chinook salmon catch or forgone gross revenues from the pollock fleet. Making estimates of changes to the gross revenues to the commercial Chinook salmon fishery may even bias the true subsistence value, when the non-monetary value of subsistence harvests is significant and not reflected in terms of gross revenues. In sum, Section 10.5.1 outlines the reasons why the economic analysis does not provide estimates of a monetary value of forgone subsistence salmon harvests. The analysis relies on a discussion of subsistence use and AEQ estimates of Chinook salmon saved as the measure of economic benefits of the alternatives and options.

Comment 10-28: The bycatch of Chinook salmon has a negative impact to the coastal areas of Bristol Bay, Yukon-Kuskokwim coastal and rivers, Norton Sounds and Canada, that depend on the Chinook salmon resources for subsistence and commercial fishing. The bycatch of Chinook salmon in 2007 is very alarming and it is no wonder that Chinook salmon numbers are declining in these coastal areas.

Response: NMFS acknowledges the comment. The degree to which levels of bycatch are related to declining returns to salmon streams in western Alaska and elsewhere is not well known.

Comment 10-29: Cumulative impacts on salmon populations, coupled with a lack of a cap on bycatch for BSAI salmon can potentially be devastating to local communities, especially indigenous peoples throughout Alaska, Russia, and Canada, as well as Pacific Northwest residents who were dramatically affected by the Pacific Coast salmon fishery shutdown in 2008.

Response: NMFS acknowledges the comment.

Comment 10-30: The economic analysis does not include the ability of salmon to multiply at an exponential rate. Salmon intercepted by the pollock fishery would have recruited exponentially in the rivers. The analysis does not cover the economic impacts to the coastal communities from the loss of increased salmon returns.

Response: Regarding the impact on numbers of salmon allowed to spawn, NMFS appreciates that salmon spawning output affects subsequent returns. However, the estimates of reduced numbers of returning salmon due to bycatch are provided in the analysis as are escapement goals and directed salmon harvest (subsistence and commercial) levels. The bycatch may more closely affect catch allowances for salmon fisheries since escapement goals are direct management targets (i.e., the managers set the salmon

fishery allowance after accounting for the desired level of salmon escapement). If bycatch mortality of returning salmon was completely discounted from escapement levels (i.e., salmon fishery managers did not follow escapement goals) then subsequent returns may be affected. However, the relationship between spawning abundance and subsequent recruitment for nearly all fish stocks (and in particular for salmon) is highly variable due to environmental conditions. This level of variability is much higher than the variability caused by a few percentage point differences in spawning escapement (unless the stock is critically endangered).

Comment 10-31: The dramatic rise in Chinook salmon bycatch by the pollock fishery cannot be allowed to continue to threaten the future sustainability of the Yukon River salmon stocks and the continuation of a subsistence way of life in Interior Alaska.

Response: NMFS acknowledges the comment. The degree to which levels of bycatch are related to declining returns to salmon streams in western Alaska and elsewhere is not well known. Based on the analysis in section 10.5.1.3, the most that can be concluded with available information is that (1) a portion of the salmon caught in the Bering Sea pollock fishery is from the Yukon River, (2) an estimate the amount of that salmon that could return to Yukon under different bycatch levels, and (3) these additional Chinook salmon would have likely increased escapements and contributed to subsistence and commercial harvests. The maximum amount of AEQ Chinook salmon estimated to return to the Yukon under the alternatives would have been 14,938 Chinook salmon in 2007, which can be compared to the 2007 combined subsistence, commercial, and sport catch of 92,876 Chinook salmon in the Yukon River (see Table 10-61).

Comment 10-32: The DEIS is written from a commercial fisheries perspective and that is not lost on those whose livelihoods rely on subsistence resources like Chinook salmon. DEIS goes to great lengths to analyze economic impacts the alternatives will have on the pollock industry. No similar approach is taken to estimate the cultural and economic impacts to WAK including the cost of replacing subsistence with store-bought foods. A more comprehensive examination is needed.

Response: NMFS agrees that the analysis provides extensive treatment of a wide range of alternatives and their associated options. This treatment is necessary due to the expansiveness of the alternative set that the Council put forward for analysis in the DEIS. It is also important to recognize that the proposed action is to directly regulate Chinook salmon bycatch in the Bering Sea pollock fishery. Thus, the economic impact analysis is necessarily focused on potential impacts on pollock fishery participants due to the fact that they are the entities that will be directly regulated under the proposed action. A similar approach to estimating impacts on Chinook salmon users is not possible because the alternatives do not directly regulate salmon fisheries.

The analysis does include extensive treatment of existing conditions in western Alaska Chinook salmon fisheries. This information begins in section 10.3 (page 529) of the RIR. This information is presented by river system with further breakout by district where available information warranted. The Norton Sound area for example is further broken down by Shaktoolik and Unalakleet Rivers and the Alaska Yukon river information is provided by district for all six districts. This information was provided to document, to the best of our ability and with the best available scientific information, trends in Chinook salmon catch in Western Alaska subsistence, commercial, sport, and personal use fisheries and serves to inform the Council of those trends.

The analysis also develops estimates of potential benefits in terms of AEQ Chinook salmon "saved" under the alternatives. The benefits estimates are provided (see table 10-58, page 630) for the preferred

alternatives and a subset of hard cap alternatives. The analysis also compares AEQ Chinook salmon savings for major river systems (Kuskokwim, Yukon, Bristol Bay) with ADF&G reported commercial, subsistence, and sport catches of Chinook salmon (see tables 10-61 through 10-63, pages 633 through 636). However, available genetic information does not allow estimation of AEQ Chinook salmon savings at the natal stream level of resolution. Thus, presently available scientific information does not allow estimation of potential increases in escapement or of potential numbers of Chinook salmon that may be made available for harvest in subsistence, commercial, sport, or personal use fisheries. As a result, it is not possible to estimate effects on subsistence food supply, commercial harvest and associated revenue, or sport and personal use catches. It is likewise not possible to estimate effects on fishing opportunities that may occur.

The analysis does consider studies that have attempted to value recreational and subsistence use and that identify a relation to replacement costs (page 532); however, lacking data on subsistence household food expenditures it is not possible to quantify replacement costs. NMFS is not aware of any study, or data source, that documents subsistence household food expenditures in Western Alaska and the available evaluations studies (see page 532) are not a suitable proxy. Furthermore, the value of subsistence use of Chinook salmon in Western Alaska likely exceeds replacement food costs due to the cultural significance of the subsistence lifestyle. Thus, replacement cost estimation is neither possible, nor a true representation of the value of subsistence harvest. Nonetheless, in recognitions of the apparent imbalance in the treatment subsistence uses of Chinook salmon, we are reorganizing subsistence information into a single section of the FEIS, and providing additional information, in order to better reflect its importance. A draft of this new subsistence section is included in the Comment Analysis Report as Appendix 9.

Comment 10-33: WAK Chinook salmon fisheries have been severely cut back for several years to the point of complete closure in some districts. Solutions to the bycatch problem have been unfairly placed on salmon fishermen and the burden should be shared by the pollock industry. Any action should place priority on preservation of salmon runs and subsistence fishermen over that of preserving the profits of the pollock fishery.

Response: NMFS acknowledges the comment.

Comment 10-34: In lieu of analysis, the DEIS points to the importance of subsistence. The DEIS asserts that fish comprise as much as 85% (by weight) of the subsistence fish and wildlife harvested in western Alaska and, of that amount, salmon contributes as much as 53%, or 650 pounds per capita (p. 531). The issue is not the importance of subsistence but whether restricting the pollock fishery makes a real difference in the amount of fish that would be available for subsistence.

Response: The purpose of the DEIS is to understanding the impacts of the alternative measures to minimize Chinook salmon bycatch in the pollock fishery and the consequences of the various levels of Chinook salmon bycatch on in-river returns. Understanding importance of subsistence to the people that live in western and interior Alaska is fundamental to understanding the impacts of the alternatives on subsistence users because it provides an understanding of the intensity of the unique risks when the degree of possible effects are uncertainty.

As explained in Chapter 10, NMFS cannot provide a quantitative analysis of the impacts on subsistence harvest, due to the inability to directly link Chinook salmon bycatch with in-river runs of Chinook salmon in any particular river system. Chapter 10 uses the best available information, which is provided and presented by region (Section 10.3). This section provides extensive background information on the subsistence (and commercial and recreational) Chinook salmon fisheries in western Alaska river systems

likely most affected by Chinook salmon bycatch. The regions are based on the ADF&G management areas (Kotzebue, Norton Sound, Kuskokwim River/Bay, Yukon, and Bristol Bay). Section 10.5.1.3 (p. 631) states that it is not possible with presently available information to determine the proportions of river-specific AEQ estimates of returning adult Chinook salmon that would be caught in subsistence fisheries (or commercial or recreational fisheries) in the various river systems of western Alaska, and further, in any particular community, under the proposed range of alternatives. The analysis relies on a discussion of subsistence use and AEQ estimates of Chinook salmon saved, with a particular focus on river systems in western Alaska, given the ability to resolve some of those river systems singularly. The estimates of Chinook salmon saved are used as the measure of economic benefits of the alternatives and options. The analysis states that it is reasonable to assume that any additional Chinook salmon (i.e., 'salmon saved') would benefit escapement and harvest to the identified river systems, and the individual dependent upon those river systems for subsistence.

While NMFS is limited to a regional assessment of potential impacts to subsistence users, NMFS agrees that the analysis should be improved. NMFS will reorganize/consolidate, clarify and update a section in Chapter 10 of the Final EIS to better address subsistence issues. A draft of this new subsistence section is included in this Comment Analysis Report as Appendix 9.

Comment 10-35: DEIS does not recognize the subsistence way of life. If the pollock catch is reduced, it costs the fleet money. If salmon do not return to our rivers, subsistence fishermen do not have enough to eat. When the offshore fleet takes salmon without appropriate restraints, subsistence families from the Bering Sea to Canada pay the price. A qualitative analysis of impacts must be included in the analysis to accurately assess the impacts of the proposed action on Native populations.

Response: Chapter 9, Section 9.4.2 describes subsistence harvests of Chinook salmon, and Chapter 10, Section 10.3 provides detailed descriptions of regional subsistence salmon fisheries throughout western Alaska. With regard to the comment that the DEIS needs a qualitative analysis of how the proposed action may affect Alaska Native populations, NMFS cannot provide a community-level impact analysis for this action, due to the inability to directly link Chinook salmon bycatch to any particular natal stream (due to data limitations). The analysis assesses the amount of 'salmon saved' under each alternative scenario, by river system, but cannot go so far as to assess the number of Chinook salmon saved that would then be used by a particular user group (e.g., subsistence, commercial, recreational salmon fishermen). The DEIS uses the best available information, which is provided and presented by region (Section 10.3). This section provides extensive background information on the subsistence (and commercial and recreational) Chinook salmon fisheries in western Alaska river systems likely most affected by Chinook salmon bycatch.

NMFS agrees that the Final EIS should provide a more complete description of subsistence users, their Chinook harvest, and the significance of this fishery to western Alaska as a food source and a source of cultural and traditional values. NMFS will reorganize, clarify, and update a section in Chapter 10 of the Final EIS to better address these issues and include a qualitative discussion of potential impacts on subsistence users. A draft of this new subsistence section is included in the Comment Analysis Report as Appendix 9.

Comment10-36: One weakness of the commercial fisheries catch data presented in the DEIS is that there is no distinction for Chinook caught in a directed fishery. This understates the potential impact of returning more Chinook to the nearshore environment were they could contribute to a directed Chinook fishery. The difference in value to the fisherman can be profound. For example on the Nushagak, in 2006 the average price for Chinook in the June directed fishery was $2.50-3.50/lb depending on market, while

for the year as a whole it averaged $0.71/lb. Nearly all of the Chinook were caught incidentally in the sockeye fishery at far less value. In 2007, the RIR shows a commercial harvest of 51,350 Chinook, but there was essentially no directed fishery.

Response: NMFS acknowledges that the available commercial catch data does not differentiate between Chinook taken in a directed fishery versus incidentally in a directed fishery for another salmon species. As a result, the available data may, as the commenter asserts, understate the commercial value of Chinook salmon if they were all taken in a directed Chinook salmon fishery. This would be a fundamental problem if the analysis relied on the average price to value potential increases in commercial harvest of Chinook salmon. However, available genetic information does not allow estimation of AEQ Chinook salmon savings at the natal stream level of resolution. Thus, presently available scientific information does not allow estimation of potential increases in numbers of Chinook salmon that may be made available for harvest in commercial fisheries, much less whether they would be taken in a directed fishery or incidental to another fishery. As a result, it is not possible to estimate effects on commercial revenue. Thus, underestimation of potential value is not a problem in the analysis; however, it is an issue to be noted in the historical treatment of commercial salmon values contained in section 10.3. That annotation will be included in the Final EIS.

Comment 10-37: The Magnuson-Stevens Act requires that management "minimize bycatch to the extent practicable." A high Chinook salmon bycatch cap is not practicable for salmon-dependent communities. The DEIS focuses on what is practicable for the pollock sector. The document considers the cost to the pollock fleet if a bycatch cap causes the pollock fleet to forego some of the pollock allowable catch. But there is a stark contrast between wealth in the pollock fleet and small village economies.

Little consideration is given in the document to what is practicable for salmon-dependent villages. Enduring a situation in which there is not enough salmon for subsistence or small-scale commercial harvest, or failure to even meet Yukon River escapement to Canada, is not practicable for the villages. The cultural and economic costs are high to all people living a subsistence way of life along the rivers and especially the Yupik, Inupiaq and Athabascan peoples who have thrived on the land for thousands of years in ways that are inseparable from natural resources including Chinook salmon. That this cannot be measured in monetary terms is not a reason to bypass the effect of continued interception of Chinook salmon in the pollock fishery. Any salmon that is allowed to be taken as bycatch at sea is a reallocation of those fish away from the rivers and the people who historically rely on them.

Response: Comment acknowledged. The DEIS does not offer any final determination on practicability in terms of applying National Standard 9 to the alternatives under consideration or in conjunction with the balancing of all National Standards, which the Council and NMFS will do before making a final decision. Instead, the DEIS endeavors to analyze all impacts from the alternatives in order to disclose such information to the public and provide the decision-makers with the necessary information to balance the National Standards and render a final decision.

NMFS appreciates the comment emphasizing the importance of Chinook salmon to subsistence users and their cultures. With respect to the practicability determination under National Standard 9, NMFS has promulgated guidelines which provide that a "determination of whether a conservation and management measure minimizes bycatch or bycatch mortality to the extent practicable, consistent with other national standards and maximization of net benefits to the Nation, should consider" ten factors, three of which are: changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources; changes in the distribution of benefits and costs; and social effects. 50 C.F.R. § 600.350(d)(3)(i) (H)-(J). Further, those guidelines provide that, when faced with uncertainty, the

"Councils should adhere to the precautionary approach . . . ." Id. § 600.350(g)(3)(ii). Accordingly, NMFS and the Council will make this determination and consider each relevant factor when they select and approve the alternative to implement the Chinook salmon bycatch management measures.

Comment 10-38: Not only does the DEIS offer no proof to support its assumption that it is taking subsistence fishermen longer to catch their subsistence harvest and that bycatch is the cause of any such delay, but the DEIS studiously ignores, and does not analyze, other factors that might be contributing to any slower subsistence harvest that may be occurring, such as food limitations, water pollution, habitat degradation, and ichthyophonus. Rather than examining these factors to determine if they are the real cause of any increased time required to take the subsistence harvest, the DEIS just assumes any problem is caused by the pollock fishery.

Response: The DEIS does not assume that the Chinook salmon bycatch in the pollock fishery has caused an increase in the time required to harvest Chinook salmon for subsistence, nor does it explain the many factors involved in the amount of time a given subsistence user spends harvesting Chinook salmon. The DEIS provides information that there is a relationship between Chinook salmon abundance and the length of time necessary to harvest salmon for subsistence as one factor in understanding the costs associated with subsistence harvests. The commenter is misinterpreting the description of existing conditions as an impacts analysis of the status quo level of bycatch. The document makes it clear that, based on existing information, we do not have a causal link between the number of salmon caught as bycatch and the annual in-river abundance of salmon which means we do know how any given level of bycatch would change the amount of time necessary to harvest Chinook salmon. The DEIS explains this uncertainty and provides the best available information. The DEIS impacts analysis provides an estimate of the number of Chinook salmon saved by major river system under each alternative and discusses what that could potentially mean to the subsistence users.

NMFS does recognize that the organization of the subsistence information in the DEIS should be improved for the Final EIS and NMFS will reorganize/consolidate, clarify and update a section in Chapter 10 of the Final EIS to better address subsistence issues. A draft of this new subsistence section is included in the Comment Analysis Report as Appendix 9.

Comment 10-39: The DEIS does not provide the basic data about how many subsistence fishermen actually have commercial salmon limited entry permits in order to support the assumption in the DEIS that subsistence fishermen could enter the commercial fishery if they could finish their subsistence harvest in less time. At the outset, the claim that this benefit exists hardly seems supportable when it is likely that eliminating the entire Chinook bycatch by the pollock fleet would increase the subsistence harvest by between one-tenth of a fish and 1.7 fish per household in the Norton Sound, Kuskokwim and Yukon regions, and by less than three fish per permit holder in Bristol Bay. The DEIS'S assumption of benefits is further eroded by the fact that a person can participate in the commercial salmon fishery only if that person holds a limited entry salmon commercial fishing permit. If one compares the number of subsistence households with the number of commercial fishing permits, one finds little support for the DEIS'S assumption that subsistence fishermen can shift into the commercial salmon fishery. And assuming 100% of the Chinook salmon bycatch stops, the DEIS does not explain how increasing the subsistence harvest by less than three fish per subsistence permit holder really shortens the time needed to complete the subsistence harvest for a subsistence fishermen.

Response: The commenter has failed to identify text in the RIR that asserts that "subsistence fishermen could enter the commercial fishery if they could finish their subsistence harvest in less time." The RIR specifically identifies current subsistence fishing schedules in section 10.3 and, using information from

ADF&G annual management reports, identifies the fact that in many areas commercial and subsistence fishing openings do not occur simultaneously. What the RIR does state (page 531) is that (emphasis added):

> Another factor in gauging the adequacy of subsistence harvests is whether subsistence harvest opportunity is adversely affected by subsistence schedules and/or subsistence catch limits on specific river systems. If the timing of subsistence openings is heavily restricted, it is more likely that pulses of fish moving upriver may be missed and catches that do occur may be smaller in number than would occur if subsistence nets were in the water for longer periods of time. Thus, it may take longer, both in hours fished and fishing periods, for subsistence harvesters to catch enough fish to meet food supply needs when subsistence schedules are restricted. Greater time needed to harvest subsistence fish can mean that less time is available to work in summertime cash employment in, for example, seafood processing and support industries, for local government, and/or in seasonal firefighting.

To our knowledge, data linking subsistence fishing households with commercial limited entry permits does not presently exist. Furthermore, the commenter's assertion that this linkage is meaningful is not accurate for several reasons. First, it ignores the fact that each limited entry permit holder may have crew members, several in some cases, which may also be members of separate (from the limited entry license holder) subsistence use families. There is no data collection mechanism in place to document crew member participation by limited entry permit. Furthermore, the crew member's home address, as identified on the crew member license, may not be in close proximity to the location of the commercial and/or subsistence fishery they participate in. Second, the assertion ignores the reality that subsistence harvesting activities are highly collaborative. In extended families there may be several subsistence families working together and the funding of their subsistence harvesting activity (e.g. fuel and equipment costs) may be dependent on commercial fisheries revenue from a single limited entry permit holder, or even a single commercial crew member. For these reasons, the assertion that there is a direct relationship between limited entry licenses and numbers of subsistence families is without merit.

Comment 10-40: The DEIS, without explanation or analysis, states that Chinook bycatch reduction could be "quite important" to commercial fishermen. DEIS at 629. Given the minimal contribution of Chinook salmon to western Alaska commercial salmon fisheries, and the small amount of AEQ fish that would actually return to western Alaska, the DEIS'S optimism is without factual foundation. The DEIS assumes benefits will flow to commercial salmon fishermen and bases the bycatch reduction plan, in part, on that assumption. However, the DEIS contains no analysis to support that assumption. If the DEIS had done the analysis, the DEIS would have found the facts do not support the assumption that commercial salmon fishermen will benefit from restrictions on the pollock fishery. Apparently doubting whether the facts support its assumption, the strongest statement in the DEIS on this issue is that an increased number of in-river Chinook "may" enhance commercial fishery opportunities. DEIS at 629.

The assumption that commercial fishermen will benefit from Chinook salmon bycatch reduction fails for three reasons. First, the AEQ mortality by river system is so small that eliminating 100% of the Chinook bycatch in the pollock fishery will offer little benefit to commercial salmon fishermen. In fact, the increase in the number of fish taken by commercial fishermen would be less than one to under three fish annually per commercial fisherman depending on the area. This is hardly the economic boom assumed in the DEIS. Second, in many river systems commercial Chinook salmon fisheries "have not occurred in recent years." DEIS at 626. There can be no expectation that a commercial fishery will suddenly become a possibility if a bycatch reduction plan is implemented, particularly given the low numbers of additional Chinook that would return to rivers. Third, Chinook salmon is simply not a large contributor to the in-river commercial fishery and to the income of commercial fishermen relative to income from other

salmon fisheries. Reductions in Chinook salmon bycatch in the pollock fishery will, even under the most optimistic hopes, have only limited effects on the income of in-river commercial fishermen. Even then, it is difficult to see how successful a commercial fishery for Chinook salmon could be given the high levels of ichthyophonus infestation in western Alaska rivers such as the Yukon.

Response: The commenter prefaces the argument challenging statements, contained in the RIR, regarding the potential importance of commercial Chinook salmon harvests in western Alaska with the statement "Given the minimal contribution of Chinook salmon to western Alaska commercial salmon fisheries..." NMFS disagrees with this assertion. The statement ignores the fact that historically the numbers and value of Chinook salmon taken in Western Alaska commercial fisheries have been considerably larger than at present. Further, the commercial value of Chinook salmon catches has historically represented a large proportion of total commercial salmon fishery value in several regions. This fact is clearly documented in section 10.3 of the RIR and will be reiterated here.
In Norton Sound historic commercial catches of Chinook salmon have approached 20,000 fish as compared to the 2007 commercial catch of 19 Chinook salmon (Table 10-18, page 544). The real (inflation adjusted) value of historic commercial Chinook salmon catches in the Norton Sound area was nearly 62 percent of total commercial catch value as recently as 1997, was 52 percent of total value in 1999, and has plummeted through the 2000s to effectively zero in 2007 (Table 10-19, page 545, Figure 10-30, page 546). This trend is also evident in the commercial Chinook salmon catch In the Kuskokwim area, where historic catches were more than 53,000 Chinook salmon in 1990, but were fewer than 200 in 2007 (table 10-28, page 562). It is true that Kuskokwim value of Chinook has historically been hampered by poor access to markets.

In the Alaska Yukon, historic commercial catches exceeded 158,000 Chinook salmon in 1981 (Table 10-30, page 568), but had fallen to fewer than 34,000 Chinook salmon in 2007. In 2008, there was no directed commercial Chinook salmon harvest allowed on the Yukon. A review of the Table 10-37 and Figure 10-47 (pages 588 and 590) reveals that the real (inflation adjusted) commercial value of Alaska Yukon Chinook salmon has historically been the single largest proportion of total commercial salmon fishery value in the Alaska Yukon, and was 80 percent of total value in 2007. Historically, commercial Chinook salmon catches on the Yukon have returned as much as $14 million (1992), but were under $2 million in 2007 and no directed fishery was allowed in 2008. In contrast to the trends identified above, Bristol Bay commercial Chinook salmon catches have held close to historic averages and are a small proportion of the total commercial value, as would be expected when compared to the commercial value of the single largest sockeye salmon fishery in the world.

Section 10.3 of the RIR, as referenced variously above, depicts a trend of sharp declines in commercial Chinook salmon catches during the late 1990s and through the 2000s in all regions of Western Alaska except Bristol Bay. These declines coincide with increased salmon bycatch in the Bering Sea pollock fisheries and available genetic data has linked Chinook salmon taken in the Bering Sea pollock fishery with the major river systems of the Kuskokwim, Yukon, and Bristol Bay. A lack of genetic data precludes linkage to Norton Sound. Thus, the statement "Given the minimal contribution of Chinook salmon to western Alaska commercial salmon fisheries..." is incorrect in light of the factual historic information provided in the RIR.

The commenter goes on to say "...and the small amount of AEQ fish that would actually return to western Alaska, the DEIS'S optimism is without factual foundation." The analysis contained in the RIR provides a comparison of the AEQ Chinook salmon savings, by river system, with the numbers of Chinook salmon caught in subsistence, commercial, and sport fisheries (See Tables 10-60 through 10-63). The AEQ Chinook salmon savings estimates will, of course, show the highest numbers of salmon saved in years

when the bycatch is highest, and considerably smaller numbers when bycatch is relatively low. A careful review of Table 10-63 (page 636) shows that in 2007, the highest bycatch year, the AEQ Chinook salmon savings for the Kuskokwim, Alaska Yukon, and Bristol Bay combined, under the most restrictive hard cap, would have been 37,345 fish, which is nearly 40 percent of the total commercial harvest of 96,483 Chinook salmon for that combined area in 2007. It is true that when disaggregated to river systems these numbers appear small. However, the fact remains that in the highest bycatch year in the analytical timeframe and under the most restrictive hard cap 40 percent of the commercial harvest in 2007 would have been returned to Western Alaska rivers as adults. Thus, the statement made by the commenter that "Given....and the small amount of AEQ fish that would actually return to western Alaska, the DEIS'S optimism is without factual foundation" is, itself, without factual foundation. Furthermore, 40 percent of the total commercial catch of Western Alaska Chinook salmon is clearly an "important" amount of potential commercial harvest. In light of the factual information provided above, NMFS disagrees with the assertion of failure on the three parts offered by the commenter.

Comment 10-41: The DEIS contains no analysis to support its assertion that if there were more Chinook salmon in Alaska's rivers, the time and resources expended by subsistence fishermen to meet their subsistence needs would be reduced, thus allowing subsistence fishermen to pursue other subsistence or income producing activities. DEIS at 531, ES 21. Given that the benefit of catching subsistence fish faster is the principal benefit relied upon to justify severe restrictions on the pollock fishery, it is curious that the DEIS offers no proof to support the existence of this benefit. The DEIS does not, for example, provide even the most basic data to show that subsistence fishermen are actually needing more time to catch their subsistence harvest, let alone that any such delay is caused by the loss of between one-tenth of a fish and three fish a year to pollock bycatch.

Response: The text included at ES 21, states that "No subsistence fishery restriction occurred in the Kuskokwim, Yukon, or Bristol Bay from 2003 to 2007; however some fishermen reported that it took them longer to catch their needed number of Chinook salmon." This information is taken directly for ADF&G official run summaries and represents the official reporting of subsistence harvest conditions. It is logical to assume that if more time is needed to harvest needed subsistence catch that less time will be available to subsistence harvesters for other opportunities, such as in wage earning employment.

Furthermore, the RIR states (page 531) that (emphasis added):

> Another factor in gauging the adequacy of subsistence harvests is whether subsistence harvest opportunity is adversely affected by subsistence schedules and/or subsistence catch limits on specific river systems. If the timing of subsistence openings is heavily restricted, it is more likely that pulses of fish moving upriver may be missed and catches that do occur may be smaller in number than would occur if subsistence nets were in the water for longer periods of time. Thus, it **may** take longer, both in hours fished and fishing periods, for subsistence harvesters to catch enough fish to meet food supply needs when subsistence schedules are restricted. Greater time needed to harvest subsistence fish can mean that less time is available to work in summertime cash employment in, for example, seafood processing and support industries, for local government, and/or in seasonal firefighting.

The RIR specifically identifies current subsistence fishing schedules, and the timing restriction they impose, in section 10.3.

Comment 10-42: Adequately assess the full direct, indirect, and cumulative impacts to the subsistence way of life for western and Interior Alaska villages. Little attempt was made to address the impacts of the

alternatives on subsistence users. The ADF&G Subsistence Division would be an invaluable asset to help NMFS improve the significant deficiencies throughout the DEIS.

Response: Chapter 9, Section 9.4.2 describes subsistence harvests of Chinook salmon, and Chapter 10, Section 10.3 provides detailed descriptions of regional subsistence salmon fisheries throughout western Alaska. NMFS agrees that the DEIS should provide a more complete description of subsistence users, their Chinook harvest, and the significance of this fishery to western Alaska. Subsistence uses of wild resources are defined in Alaska state law as 'noncommercial, customary, and traditional uses' for a variety of purposes, including: direct personal or family consumption; for the making and selling of handicraft articles out of non-edible byproducts of resources; and for the customary trade, barter, or sharing for personal or family consumption. The analysis will be revised to better emphasize that subsistence is a complex system that is tied to Alaska Native peoples food, traditions, and culture, and typically involves the community, not just the individual fisherman.

NMFS will reorganize/consolidate, clarify and update a section in Chapter 10 of the Final EIS to better address subsistence issues. Note that NMFS cannot provide community/village level impact analysis for this action, due to the inability to directly link Chinook salmon bycatch with in-river runs of Chinook in any particular community. The DEIS uses the best available information, which is provided and presented by region (Section 10.3). This section provides extensive background information on the subsistence (and commercial and recreational) Chinook salmon fisheries in western Alaska river systems likely most affected by Chinook salmon bycatch. The regions are based on the ADF&G management areas (Kotzebue, Norton Sound, Kuskokwim River/Bay, Yukon, and Bristol Bay). In addition, Chapter 10, Section 10.5.1.3 (p. 631) of the DEIS states that it is not possible with presently available information to determine the proportions of river-specific Adult Equivalency (AEQ) estimates of returning adult Chinook salmon that would be caught in subsistence fisheries (or commercial or recreational fisheries) in the various river systems of western Alaska. This section notes that while it is difficult to assess the specific impacts of additional AEQ Chinook to a given river system, it is reasonable to assume that any additional fish would benefit escapement and harvest.

Comment 10-43: The Problem Statement adopted by the Council states salmon bycatch "must be reduced" to address concerns about subsistence fishermen in rural areas who depend on local fisheries for their sustenance and livelihood (pg 1). Recognizing the very real and important role that subsistence has in the life of many Alaskans, the sad reality is that restricting the pollock fishery will have not have the positive benefits for subsistence that the DEIS implies. In fact, the central problem with the DEIS is that it assumes these benefits will occur without doing an analysis of the impacts of the alternatives on the availability of Chinook salmon for subsistence. If the DEIS had done so, it would have found that even if 100% of the Chinook salmon bycatch was eliminated, the subsistence harvest would have increased by only one-tenth of one fish per household in the Norton Sound area, just over one fish per household in the Kuskokwim area, 1.7 fish per household in the Yukon, and less than three fish per permit holder in Bristol Bay.

Response: This comment misconstrues the role the Council's problem statement plays in the process, ignores other language in the problem statement that puts this excerpted language in its proper context, and makes an improper extrapolation from the analysis in the DEIS.

The Council issues its problem statement as one of the first steps in the process for amending fishery management plans and/or promulgating regulations. It is a trigger for the NEPA process and, as a result, occurs before the EIS is drafted. The problem statement reflects the concerns of the Council, which is a body of 11 voting members who typically offer several viewpoints. It is important for NMFS, the public,

and the regulated fishing community to understand the problems that form the incipient stage of the Council's action, and it guides in the development of an EIS's Statement of Purpose and Need.

Here, the Council properly expressed its concern due to the high Chinook salmon bycatch levels by the pollock fishery. The problem statement identifies several reasons for the Council's concern, including the high value of Chinook salmon to commercial, subsistence, and sport fisheries; the command in National Standard 9 to minimize bycatch to the extent practicable; and the low salmon runs in Western Alaskan rivers. See at DEIS at 1. The problem statement also states that the reasons for those low runs are uncertain, but the increases in bycatch by the pollock fishery "may be a contributing factor." Id.

Following the Council's problem statement, NMFS and the Council developed the DEIS to analyze alternative management measures, the purpose of which, as set forth in the DEIS's Statement of Purpose and Need, is "minimize Chinook salmon bycatch to the extent practicable, while achieving optimum yield from the pollock fishery." DEIS at 2. NMFS agrees that subsistence plays a very important role in the culture and lives of many Alaskans, and subsistence users may benefit from the minimization of bycatch of the species on which they rely. NMFS disagrees, however, that the DEIS overstates or assumes the existence of benefits from the minimization of Chinook salmon bycatch in the pollock fishery.

Rather, the DEIS uses a three-step approach to explain what the potential benefits may be, which, in light of the problem statement and scoping comments, is an issue of great concern to the Council and public. In the first step, the DEIS analyzes reductions in bycatch numbers or salmon saved from bycatch by the pollock fishery, and the DEIS is careful to point out that this number does not represent the actual numbers of salmon that will return to their rivers of origin. See, e.g., DEIS at ES-15, 108. In the second step, the DEIS employs an adult-equivalency model to estimate how the bycatch reductions from the various alternatives would translate into spawning salmon because "not all salmon caught as bycatch in the pollock fishery would otherwise have survived to return to their spawning streams." Id. at 111. Finally, based on the best scientific information available, the DEIS incorporates into the adult-equivalency model "genetic estimates of Chinook salmon taken as bycatch to determine where the [adult-equivalent] salmon would have returned." Id. at 116.

Since there is no information available and it is impossible to predict, the DEIS makes no assumptions as to the fate of those returning salmon. The DEIS clearly states in a number of places that it is not possible, with presently available information, to determine the proportions of river specific AEQ estimates of returning adult Chinook salmon that would have been available for escapement or caught in commercial, subsistence, and sport fisheries in the various river systems.

Finally, it is important to recognize that the express language of National Standard 9 provides that "[c]onservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch." 16 U.S.C. § 301(a)(9). Minimize means "to reduce to the smallest possible number, degree, or extent." Webster's Third New International Dictionary of the English Language (Unabridged) (1963). NMFS has promulgated guidelines for implementing this standard, see 50 C.F.R. § 600.350. Of course, National Standard 9 does not exist in a vacuum. Rather, it is the Council and NMFS's role to ensure that the final action complies with all ten National Standards. Where there is tension among competing standards, the standards are balanced in light of the MSA's over-arching purposes.

Comment 10-44: How can any American defend giving Japan and Norway more fishing quotas than the local villages?

Response: This question is out of the scope of the management measures currently being considered. NMFS notes that this document is intended to provide decision-makers and the public with an evaluation of the predicted environmental, social, and economic effects of alternatives measure to minimize Chinook salmon bycatch in the Bering Sea pollock fishery. That being said NMFS disagrees with the assertion that foreign vessels are allocated more quota than local villages. Magnuson-Stevens Fishery Conservation and Management Act (MSA) originally enacted in 1976, is the primary law governing marine fisheries management in the federal waters of the United States. Congress passed the MSA to conserve and manage U.S. fishery resources, develop domestic fisheries, and phase out foreign fishing activities within the 200-mile zone adjacent to the U.S. coastline (an area known as the Exclusive Economic Zone or EEZ).

Comments on the importance of salmon and existing conditions

NMFS acknowledges the following comments on the importance of Chinook salmon and the current status of the Chinook salmon resource and the individuals who rely on Chinook salmon.

- The 2008 Chinook salmon run was very poor on the Yukon River, as well as throughout Western Alaska. On the Yukon, subsistence fishing time was reduced by half in Alaska part way through the season, and people met 40 percent of less of their subsistence needs in some places. In Canada, subsistence (aboriginal) fishers voluntarily restricted themselves to half of their historic take. In one community these voluntary restrictions resulted in a total Chinook harvest of only 160 Chinook salmon. The aboriginal harvest for the entire Canadian portion of the run was 2,766 fish, based on preliminary data. There was no directed commercial Chinook salmon fishery on the Yukon in 2008, and the commercial chum fishery was delayed to allow Chinook salmon to pass through, reducing the chum salmon harvest as well. Despite these restrictions, estimated Chinook salmon spawning escapement into Canada was only 32,700 fish, 27 percent below the Yukon River Panel agreed upon goal of 45,000 fish. The outlook for this coming summer is no better: ADF&G and U.S. Fish and Wildlife Service are preparing users for further subsistence restrictions in 2009, and have already stated that it is unlikely that a commercial Chinook salmon fishery will be allowed. Fishermen and women throughout the watershed are participating in teleconferences to develop management measures which can be used to restrict their own subsistence harvest to provide escapements to ensure health salmon runs in the future.

- Many Yukon River drainage fishers have been reluctant to consider in-river regulatory gear changes. When they see that, in 2007, approximately 29,000 Yukon River-bound Chinook salmon were harvested as bycatch in the BSAI pollock fishery. That bycatch amount equates to 57% of the total U.A. Chinook salmon subsistence harvest in the Yukon River, and exceeds the 2007 Canadian border passage mark/recapture estimate of 24,000 Chinook salmon. In 2008, the spawning escapement goal in Canada of not less than 45,000 Chinook was not met. The 2009 salmon run is projected to be very low, with restrictions on subsistence fishing and no commercial fishing likely.

- In the past, Chinook salmon provided not only for summer and fall subsistence harvest, but also as a source for jobs for many youth in villages in the region. Before 1998, commercial fishermen had harvest guidelines up to 225,000 Chinook salmon. Last year, there was not Chinook fishery. Commercial fishermen harvested approximately 4,000 Chinook only in incidental catches to the chum fishery. Before 1998, the subsistence fishermen would achieve their goals relatively

quickly after the arrival of the Chinook salmon. Now, it takes longer due to the harvest windows and areas restrictions, which limits time available to pursue other critical activities essential to subsistence based life.

- A healthy and thriving salmon fishery is vital to the Native communities of the Yukon and Kuskokwim Rivers' traditional subsistence way of life. Chinook salmon is the major harvested fish for people of the Yukon and Kuskokwim Rivers. The Native villages of the area are among the poorest in the United States as measured by monetary income and jobs. The Lower Yukon and Lower Kuskokwim Rivers also support a small commercial salmon fishery that serves as a crucial income source for the people who live there. However, Chinook and other salmon fisheries are in decline on the Yukon River and the State has shut down the commercial fishery due to poor runs. As a result, the Yukon River communities have lost a major income source from commercial salmon fisheries.

- Subsistence users carry the burden of conservation, even though the causes of the salmon decline are definitely not the result of our subsistence users along the Yukon River. To our understanding, there may not be enough Chinook salmon for our subsistence users this coming summer. Since the mid 1980's, subsistence users have been first hand dealing with the task of rebuilding our salmon stocks by reducing the amount of salmon available for subsistence fishing.

- The subsistence and commercial in-river fishermen and their communities are incurring extreme expense from the increasing fishing restrictions, high fuel costs, and their decreasing catch per unit of effort from the pollock fishery's salmon bycatch. Rural villages are declining in population because of the increasing high cost of living in rural Alaskan communities. Couple these challenges with the declining size of the returning Chinook salmon and fewer large females reaching the spawning grounds and we may be looking at a serious conservation concern that may result in a serious burden on subsistence fishermen that they are unable to withstand. Continuation of a subsistence way of life and the economic underpinnings of our villages depend on viable and sustainable salmon stocks.

- Salmon is an irreplaceable resource that must be protected by all means. The recent high salmon bycatch in the pollock fishery threaten salmon and the Alaska Native way of life. Salmon serves an important cultural and economic role in Alakanuk and throughout Western Alaska. Salmon provides a primary source of food for local residents, and the commercial salmon harvest provides the only means of income for many who live in the remote villages of the Yukon River.

- Chinook salmon are a fully allocated species, vitally important to subsistence, commercial, and recreational users throughout Alaska. They remain a cornerstone resource in meeting the needs of rural Alaskans, and have been the foundation of subsistence and commercial economies in remote Alaska for many generations.

- Significant reduction in bycatch is necessary to preserve the subsistence way of life. The incredibly high bycatch numbers associated with the pollock fishery in recent years is alarming to say the least. Bycatch of Chinook salmon threatens the western Alaska salmon populations and those that depend on these salmon to maintain their subsistence way of life as well as commercial harvests. Those in the western Alaska villages are witnessing a troublesome decline in what was once a sustainable subsistence harvest. Additionally, because of the decline, regulation of subsistence fisheries continues to tighten, increasing the difficulty for families to harvest salmon,

especially in upriver villages. The continued interception of Chinook salmon in the Bering Sea will continue to keep these traditional fisheries depressed.

Comments on consumers and markets

Comment 10-45: Pollock buyers have been willing and able to accept supply uncertainty due to changing biomass size, the type of uncertainty and risk associated with bycatch-related closures will likely cause some of the large end-users to shift usage from pollock to other species. Chapter 10 suggests that if the pollock fishery were shut down prematurely due to a hard bycatch cap or if the fishery were unable to catch the quota due to a large area closure, there would be a loss of revenue due to the forgone production, but that loss would be mitigated by an increase in price as a result of the reduced supply. This severely understates the negative impact of such a closure on the market for U.S.-produced pollock products. We believe strongly that a bycatch management system which substantially increases the risk that the fishery will be closed prior to reaching the quota with little or no advance notice removes the strongest advantage the fishery holds in world wild whitefish markets, the reliability of the supply. Without the confidence that the quota will be taken, large restaurant chains and large processors that produce breaded and battered products will be unwilling to enter into long-term agreements or create marketing campaigns or promotions that require a stable supply of raw material. Single-frozen pollock fillet blocks from the U.S. fishery will lose their current advantage in the marketplace and large customers who are unwilling to risk abruptly running out of product will convert to the more reliable supplies of aqua-cultured finfish or simply drop whitefish menu offerings altogether. The negative effect on prices and quantities demanded from the fishery would be dramatic-and perhaps permanent.

Response: It is not disputed that a reduction in harvest of pollock would have impacts on pollock product supply in domestic and export markets. The RIR qualitatively discusses the general implications for markets and consumers (see page 699). However, presently available data and models do not allow estimation of consumer surplus and/or producer surplus in final product markets and these measures are the appropriate economic welfare measures to consider (see response to comment 10-99, which is incorporated by referenced here).

More importantly, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as potentially forgone revenue or revenue at risk, depending on alternative. The RIR does not identify these impact estimates as lost revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Furthermore, the Council's stated preliminary preferred alternative modifies the strict hard cap formulations contained in Alternative 2 by including provisions for an industry managed Intercooperative Agreement (ICA provision) to reduce Chinook salmon bycatch to levels below the strict hard cap via industry derived incentives. Clearly, the Council's intent is to incentivize Chinook salmon bycatch avoidance in order to reduce it and the hard cap used in the potentially forgone revenue analysis is one part of the incentive. The implication is that the pollock industry will change behavior so that they do not face all of the potential forgone revenue, and/or revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

Comment 10-46: Closure of the directed pollock fishery due to Chinook salmon bycatch regulations would deprive the U.S. and world of substantial quantities of high-quality, relatively low-cost protein. Assuming an average of four ounces of fish per meal, for every 100,000 mt of pollock lost, we forego protein for more than 250 million meals, or enough to feed the combined populations of Dallas, Detroit,

Indianapolis, Seattle, San Francisco, and Anchorage one meal per week for an entire year. Source: National Marine Fisheries Service Processed Product Reports.

Response: It is not disputed that a reduction in harvest of pollock would have impacts on pollock product supply in domestic and export markets. The RIR qualitatively discusses the general implications for markets and consumers (see page 699). However, presently available data and models do not allow estimation of consumer surplus and/or producer surplus in final product markets and these measures are the appropriate economic welfare measures to consider (see response to comment10-99, which is incorporated by referenced here).

More importantly, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as *potentially* forgone revenue or revenue *at risk*, depending on alternative. The RIR does not identify these impact estimates as *lost* revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Furthermore, the Council's stated preliminary preferred alternative modifies the strict hard cap formulations contained in Alternative 2 by including provisions for an industry managed Intercooperative Agreement (ICA provision) to reduce Chinook salmon bycatch to levels below the strict hard cap via industry derived incentives. Clearly, the Council's intent is to incentivize Chinook salmon bycatch avoidance in order to reduce it and the hard cap used in the potentially forgone revenue analysis is one part of the incentive. The implication is that the pollock industry will change behavior so that they do not face all of the potential forgone revenue, and/or revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

One final response to this comment is in order. The development of the RIR is done in compliance with Executive Order 12866. The Executive Order specifies a cost-benefit analytical framework, either qualitatively or quantitatively where possible, and consideration of the implications for net national benefits. It is important to understand that the Office of Management and Budget has determined that effects on non-us citizens do not enter into the net national benefit calculation defined as the appropriate analytical metric in Executive Order 12866. Thus, implications on world markets, world food supply, and non-US consumers are not appropriate considerations in the analysis contained in the RIR.

Comment 10-47: The DEIS does not consider or evaluate the market implications of premature closures or the effects such closures would have on the U.S. balance of payments in seafood products. Nor does it consider the effect that such closures would have on the viability of members as reliable suppliers to the world market for seafood. The DEIS is devoid of such considerations even though food production and seafood exports were principal objectives of Congress when the Magnuson Act was passed in 1976, and when the "maintenance of optimum yield on a continuing basis" requirement of National Standard 1 was first implemented.

Response: As discussed in response to comment 10-46, which is incorporated by reference here, the appropriate metric for evaluation in a RIR is the cost-benefit metric with a consideration of effects on net national benefits. The U.S. Balance of Payments is an accounting metric that is outside the scope of the required economic analysis. And, as pointed out in the response to comment 10-46, the world market for seafood products is also not an appropriate consideration in an RIR. As to the viability of seafood suppliers, we reference the discussion in response to comment 10-46 regarding the intent of the Council to incentivize Chinook salmon bycatch avoidance as opposed to an intent to prematurely close the pollock fishery.

Comment 10-48: The DEIS fails to analyze the job loss and revenue implications of the market disruption that will occur because of additional bycatch restrictions. The DEIS ignores the fact that "forgone revenue" comes from forgone product - and forgone product means end use purchasers will need to secure alternative sources of supply. Forgone product of the magnitude envisioned by Alternatives 2-4 will cause end use purchasers to turn away from the Alaska market as a source of supply, multiplying the economic impacts and hardships caused by Alternatives 2-4. Again, the DEIS does not even recognize the issue, much less analyze it. The net result for Alaska, its workers, and the nation, is that Alaska's fish products will not be as desirable as they are today. Simple supply and demand economics means prices for Alaska's fish will fall. The well settled business principle that end users need assured supplies to support production lines and marketing programs means less demand and fewer purchase orders. Lower prices and less demand means fewer jobs. It also means lower revenue for those who remain in the fishery. Finally, it means lower revenue for CDQ communities and for other communities that depend on fish taxes. And absolutely none of these issues are considered in the DEIS.

Response: The statement that the "The DEIS ignores the fact that "forgone revenue" comes from forgone product - and forgone product means end use purchasers will need to secure alternative sources of supply" is a misstatement of fact. The DEIS evaluates the effect of the alternatives on pollock harvest. The RIR then converts potential forgone pollock harvest to potential forgone revenue using the round weight equivalent first wholesale price per metric ton of retained pollock harvest (see response to comment 10-71 for more information on prices used in the analysis). Thus, the analysis addresses potential forgone revenue at the first wholesale product market level, which clearly identified potential effects on all first wholesale products derived from Bering Sea pollock.

As indicated in the response to comment 10-46, the proposed action incentivizes bycatch avoidance and identifies "potential" forgone revenue with the expectation that industry will attempt to mitigate these losses by avoiding bycatch. Thus, these impacts are worst case upper bound impacts and would only occur if industry does not modify harvesting behavior to avoid Chinook salmon bycatch. As such, the commenter's assertion of a cascading negative effect on pollock markets relies on a series of questionable assumptions. First, given the large size of the pollock fishery, it is no simple matter for world purchasers to "turn away" from Alaska pollock. It is just as likely that contraction in pollock supply will drive pollock prices up considerably. An increase in pollock prices were observed, for example, in 2007 when TAC was reduced and comments 10-85 have asserted significant price increases have occurred since 2005. Thus, it has been observed that contraction in pollock supply, as predicted by basic supply and demand economics, drives prices up, not the other way around. As a result, assertions of job losses due to reduced prices are questionable and NMFS does not agree with this highly assumptive projection of impacts in absence of consideration of the likelihood that industry will modify harvesting behavior to minimize Chinook salmon bycatch when faced with a binding constraint of a hard cap.

Comment 10-49: Forgone revenue does not capture the impact that unanticipated interruption in the production of pollock-based products would have on the market for the products produced by the nation's largest fishery or on the role that Alaska pollock currently plays as the "'whitefish of choice" in seafood markets around the world. In terms of food production alone, every one thousand tons of forgone pollock catch equates to approximately 2.4 million meals of low-cost seafood that would otherwise be available to US and other consumers around the world. In terms of food production alone, every one thousand tons of forgone pollock catch equates to approximately 2.4 million meals of low-cost seafood that would otherwise be available to US and other consumers around the world. Based on recent catch and bycatch rates as depicted in the DEIS, the difference between a "hard" bycatch cap of 68,392 and a cap of 47,591 Chinook could result in hundreds of thousands of tons of forgone pollock harvest. To put that in perspective, each hundred thousand tons of forgone harvest represents enough raw material to provide

every man, woman and child in Alaska a seafood dinner once a week for more than seven years. The forgone revenue analysis fails to disclose that such a stunning reduction in seafood production would result from the choice of one cap over the other. It must be remembered that seafood production is one of the most important objectives insofar as National Standard 1 of the Magnuson Stevens Act is concerned.

Response: The RIR does discuss market implications; however, presently available data and models do not allow estimation of consumer surplus and/or producer surplus in final product markets, and these measures are the appropriate economic welfare measures to consider. It must also be remembered that in balancing National Standard 1, the Council must consider National Standard 9 which requires minimization of bycatch to the extent practicable. It is up to the Council, and ultimately the Secretary of Commerce, to determine the practicable level of Chinook salmon bycatch reduction in consideration of all of the national standards.

NMFS disagrees with the characterization of potentially forgone pollock harvest as potential pollock consumption in Alaska. Very little pollock harvested in the Bering Sea is consumed in Alaska. Much of the product is exported, as the commenter has already confirmed in several related comments on importance of pollock in world markets. As has been pointed out in the response to comment 10-46, it is inappropriate for a RIR analysis to consider effects on pollock harvest that accrue to non-us citizens. Thus, this characterization is misleading at best as few Alaska resident consumers benefit directly from pollock production.

Comment 10-50: The DEIS ignores the fact that the U.S. exports close to $1 billion of Bering Sea pollock products annually to countries around the world. "Forgone revenue" comes from less product, and fewer exports means an increased U.S. trade deficit. The DEIS does not analyze this issue.

Response: NMFS disagrees that the DEIS, or more specifically the RIR, ignores the importance of exports of pollock fishery products. Section 10.2.3 (page 502) provided data compiled by the Alaska Fisheries Science Center on the Market Disposition of Alaska Pollock, which includes discussion of exports. Furthermore, as discussed in response to comment 10-46, which is incorporated by reference here, the appropriate metric for evaluation in a RIR is the cost-benefit metric with a consideration of effects on net national benefits. The U.S. trade deficit is an accounting metric that is outside the scope of the required economic analysis. And, as pointed out in the response to comment 10-46, the world market for seafood products is also not an appropriate consideration in an RIR.

Comment 10-51: On page 702, the reader is led to believe that welfare changes cannot be measured with current information about the demand for different fish species and products. Yet, for the past 30 years NMFS has collected and analyzed information about fish prices and the quantities consumed by the public. Indeed, NMFS is the nation's pre-eminent source for information about seafood markets and trade. The current version of the Economic Status of the Groundfish Fisheries Off Alaska, 2008, produced by the NMFS Alaska Fisheries Science Center, is approximately 300 pages and documents the prices paid and catch quantities landed for all groundfish off Alaska (Hiatt et al. 2008). The current Fisheries of the United States 2007 (NMFS 2008) includes data and information on U.S. commercial fishery landings, world fisheries, U.S. production of processed fishery products, U.S. imports, U.S. exports, and the U.S. supply fishery products, including per-capita estimates of consumption and value added. It is not correct to state that welfare changes cannot be measured with the available information. The DEIS simply does not do the analysis.

Response: The ability to mathematically derive welfare measures is fundamentally dependent upon empirical data on, among others, input prices, costs, capital investment, debt service, consumer demand,

sources of supply, market structure, substitutes and complements, measures of consumer responsiveness to changes in price, quantity, quality, income, tastes, and preferences. Exogenous factors also influence rigorous derivation of these welfare measures, such as, currency exchange rates, tariffs, political and economic instability. Very few of these necessary data are available to NMFS, at present. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. At present, the analysts must employ methods and strategies predicated on extremely limited data and virtually non-existent economic modeling of these resources and uses.

Comment 10-52: The DEIS also fails to recognize, let alone analyze, the inflationary and consumer impact of "forgone revenue." Revenue is forgone because there is less product to sell. Basic supply and demand principles suggest the consumer is the victim in that the consumer will now pay higher prices.

Response: The RIR does discuss the potential for effects on consumers (page 699) and identifies that reductions in product supply will likely lead to inflationary pressures on prices, resulting in improvements in producer surplus that will, to an unknown extent, offset reduced consumer surplus. However, as pointed out in the response to comment 10-51, our ability to mathematically derive these changes in welfare measures is limited by a lack of data on industry costs. Both comments cite "basic supply and demand principles" for these assertions.

Comment 10-53: The DEIS provides even less information about changes in consumer welfare than it does about producer welfare. The only mention of consumer surplus is a brief summary of the results of several studies on the estimated values of subsistence and sport catches of salmon. DEIS at 532. Apparently, the results are dismissed simply because they show very low implicit values (consumer surplus) for subsistence and sport-caught salmon. The only mention of consumer benefits is the single occurrence within a brief discussion about costs to consumers. DEIS at 702. As such, the DEIS contains no information about the potential for and/or scale of the changes in consumer welfare that may accompany the bycatch management alternatives. DEIS at 702. In particular, the DEIS contains no mention of the suspected size of the changes in U.S. consumer welfare for any alternative of lower pollock catches, or how these changes might compare to changes in the welfare of salmon users due to assumed increases in Chinook salmon returns to western Alaska river systems.

The DEIS goes on to state that: The second part, corresponding to a reduction in consumer benefits because consumers have to pay higher prices for the fish they continue to buy, would be offset by a corresponding increase in revenues to industry (i.e., producers' surplus gains). While a loss to consumers, this is not a loss to society. It is a measure of the benefit that consumers used to enjoy, but that now accrues to industry in the form of increased prices and additional revenues. DEIS at 702. However the market conditions under which this assertion could be considered even approximately correct are so restrictive that the statement does nothing but mislead the public (e.g., see Just, Hueth, and Schmitz, Chapter 9 Multimarket Analysis and General Equilibrium Considerations).

Response: The RIR examines the few available studies that have attempted to value subsistence and sport caught catches using non-market analysis methods (page 532). The RIR provides a clear reason why a "benefits transfer" approach is not appropriate in this case. The RIR at page 532 states:

"Unfortunately, the range of consumer surplus benefits found in the above mentioned studies could not be directly applied (e.g., via benefits transfer) to subsistence activity in western Alaska. This is largely because it is difficult to define a similar "trip" in western Alaska, due to differing transport modes (e.g., riverboat vs. car) and duration (e.g., a week or an opening vs. a day or a weekend). The results of these

studies do, however, suggest the importance of subsistence salmon harvests to rural residents is higher than non-rural residents, and that subsistence harvest has a "market-based" economic equivalent value potentially as high as replacement cost. It is likely, however, that this "market-based" equivalent value estimate does not full capture the benefits subsistence users derive from the harvesting of salmon, especially in western Alaska. More comprehensive and accurate evaluation of these values must await future empirical research."

Note that the actual value of the consumer surplus estimates is not mentioned. Thus, the commenter's assertion that "the results are dismissed simply because they show very low implicit values (consumer surplus) for subsistence and sport-caught salmon" is not a statement of fact and seriously misrepresents what is contained in the RIR. The remainder of the comment has previously been treated. See responses to comments 10-51, 10-52, and 10-83 which are incorporated here by reference.

Comments on other costs

Comment 10-54: Monitoring of hard caps on an individual vessel by vessel basis will require additional observers. DEIS should evaluate the number of extra observers needed to monitor vessel-specific salmon bycatch numbers and the costs associated with such extra coverage.

Response: Section 10.5.7.1 of the DEIS does evaluate the number of extra observers necessary under the alternatives and the costs associated with that extra coverage.

Comment 10-55: These economic costs, never examined by the DEIS, represent only one part of the overall costs of being forced to travel long distances to fish. The economic costs pale in comparison to the possible human costs. The Bering Sea is a dangerous place at any time of the year. In the winter "A" season, it is particularly forbidding. Forcing fishermen to travel farther in freezing temperatures and icing conditions increases the risk of injury and loss of life, issues the DEIS does not examine except to say this might be an issue. Human safety is indeed an issue, codified in National Standard 10 of the MSA, 16 U.S.C. § 1851(a)(10).

Response: The RIR does discuss vessel safety (page 697) and NMFS acknowledges that human safety is of critical importance in the management of fisheries. Unfortunately, it is not possible to predict the changes in behavior that the industry might undertake to avoid Chinook salmon bycatch and the effect on vessel, and human, safety. It is important to recognize; however, that the AFA pollock fishery is a rationalized fishery operating under a cooperative structure. A careful review of the alternative set reveals that the hard cap alternative (Alt. 2) and the preferred alternative (Alt. 4) both contain provisions for cooperative level allocations, rollovers, and transfers. Thus, the alternative set includes measures to mitigate the possibility for a "race for fish" that could occur under unallocated bycatch caps. These provisions also provide some mitigation of the associated impacts on vessel, and human, safety that might exist if a "race for fish" were created due to a bycatch cap.

Comment 10-56: The costs and lost revenues that have been incurred by the pollock fleet over the years, and those that will be incurred to avoid and minimize Chinook bycatch in the future have not been adequately characterized in the DEIS. The industry has independently changed fishing practices in an effort to reduce salmon bycatch. They have developed the salmon excluder device for their trawl gear, and they have voluntarily closed areas even though such closures have reduced revenues and increased expenses. The industry, through Sea State, Inc., has developed a real-time monitoring system for the fleet. The harvesters have also developed and implemented all of the inter-cooperative agreements and continue

to work on incentive plans to reduce Chinook bycatch, and they have participated in funding many other research projects. These costs and lost revenues have been and will continue to be huge.

Response: NMFS acknowledges the attempts that industry has made to avoid Chinook salmon bycatch. In fact, the RIR contains most of the content of the Sea State report to the Council on the operation of the Voluntary Rolling Hotspot System through 2007. See section 10.2.4., beginning on page 510 and continuing through page 526. Unfortunately, cost of production data with which to evaluate the costs to industry of their efforts to avoid Chinook salmon bycatch via the VRHS has not been provided by industry. Thus, it is not possible to estimate operating cost impacts of the VRHS system or of similar costs that might occur under the alternatives under consideration in the proposed action. NMFS acknowledges the work the industry has undertaken to develop, and maintain, the intercooperative agreements. And, while it is understood that those activities are not costless, the information needed to assess these costs, such as attorney fees and contracted bycatch monitoring fees are proprietary and have not been provided by industry. Finally, NMFS also acknowledges the work that has been done to develop salmon excluder devices. However; such devices are in experimental stage of development and it is not presently clear how effective they will be, how may vessel operators will voluntarily use them, and what average reduction in bycatch might be brought about via their use.

Comment 10-57: The DEIS suggests that pollock fishing vessels, catcher processors and/or motherships can mitigate losses imposed by salmon bycatch caps by shifting to other groundfish fisheries. DEIS at 692. The DEIS is wrong. The opportunities for pollock vessels to participate in non-pollock fisheries have been severely limited by (1) the "sideboard" restrictions imposed on pollock fishing vessels and processors by Section 211 of the American Fisheries Act ("AFA"), 16 U.S.C. § 1851, Note, (2) restrictions imposed by the license limitation provisions of the BSAI Groundfish Fishery Management Plan, (3) the provisions of Amendments 80 and 85 that allocate opportunities to participate in non-pollock groundfish fisheries to vessels that do not also fish for pollock, and (4) Steller sea lion mitigation measures that establish seasonal restrictions on the fishery. The net effect of these "sideboards" and other restrictions is that pollock vessels and processors cannot make up lost pollock harvest by transferring to new groundfish fisheries.

Response: NMFS acknowledges that the ability of AFA pollock vessels to shift to other groundfish fisheries is limited by the cited regulatory amendments and sideboards. However; the RIR did not assert that pollock operations could switch to a "new groundfish fishery.": What the RIR actually states, on page 692, is that pollock vessels may mitigate by "...(3) switching to a different target fishery (e.g. yellow fin sole)." It is true that AFA pollock operations have access to other groundfish fisheries in the Bering Sea and an expanded treatment of that access under the AFA sideboards as well as under recent rationalization programs will be included in the FEIS.

Comment 10-58: The DEIS fails to consider the loss in value of the raw fish due to decreases in fish quality caused by the extended travel time that would be required to deliver the fish to the processor. Generally, a catcher vessel seeks to deliver its fish within 48 hours of its first tow on the fishing grounds. If this delivery time is extended beyond 48 hours, the value of the fish is reduced because of the quality or grade of final product the processor can produce. This is particularly true in the "A" season when roe quality decreases with the additional time fish are held on the vessel.

Response: Section 10.5.5.2 (page 701) of the RIR is titled Longer Travel to Deliver Fish, and specifically discusses the issue. That discussion notes that longer travel time may lead to reduced quality and value. Unfortunately, the potential impact cannot be addressed quantitatively because it is not

possible to predict exactly how changes in harvesting behavior to avoid Chinook salmon bycatch will affect the spatial and temporal patterns of future pollock harvesting.

Comment 10-59: The DEIS assumes pollock fishermen will move to new pollock fishing grounds if Alternative 2, 3, or 4 is adopted. DEIS at 165. Since the pollock fleet is already fishing the most productive and economic areas, it goes without saying that Alternatives 2-4 will impose additional costs on the fleet, but the DEIS does not analyze these costs. Nor does it examine the impacts of increased energy consumption. The DEIS fails to consider the enormously increased energy usage that will flow from Alternatives 2-4 at a time when energy conservation is a national priority, and these additional energy costs do not include all the additional operational and repair costs associated with longer trips. The DEIS does not provide the basis for making an informed decision regarding these issues because the DEIS has no analysis of these issues.

Response: Quantitative estimation of the cost impacts of proposed Chinook salmon bycatch reduction measures requires extensive data on operating costs, including, but not limited to, expenditures and consumption of fuel. However, the pollock fishing sectors operating in the U.S. EEZ off Alaska have, over many years, consistently (although, certainly not uniquely) refused to provide company level, much less operational level, cost data that would permit NMFS to empirically estimate the operational cost impacts on the sector, attributable to the proposed Chinook bycatch reduction action. In the absence of these data, it is not possible to estimate cost effects, including increased fuel consumption. Thus, at present, the analysts must employ methods and strategies predicated on extremely limited data and virtually non-existent economic modeling of these resources and uses.

Confronted with these facts, NMFS is nonetheless legally obligated to analyze, to the fullest extent practicable, the benefits and costs (as well as their expected distribution) of the proposed management actions being considered. These mandates (e.g., E.O.12866, OMB Circular A-4, MSA) recognize and explicitly provide for adoption of qualitative analytical strategies and approaches to evaluating benefits and costs in the absence of fully adequate empirical data and quantitative models. The RIR provides a qualitative discussion of the potential effects on variable costs (section 10.5.3.2, page 693) and provides information on rising fuel costs in western Alaska in recent years (Figure 10-59). Thus, the RIR adheres to the requirements of the aforementioned mandates and does provide, using the best scientific information, a basis for making an informed decision.

Comments on pollock-dependent communities

Comment 10-60: Salmon bycatch limits that prematurely close the pollock fishery or otherwise reduce landings and associated tax revenues will be felt throughout Alaska, but particularly in rural areas that depend on the pollock industry. Between 2000 and 2007, the two state fisheries taxes applied to the pollock fishery generated an average of $9,875,000 in annual revenue to the State from landings in the Aleutians/Pribilof region alone. DEIS at 502, Table 10-4. Although the DEIS admits that implementation of Alternative 2 could have resulted in lost tax revenue to the State of up to $5.8 million in 2007, and that implementation of Alternative 4 could have resulted in lost tax revenue to the State of up to $3.5 million in 2007 (ld. at 708, Table 10 - 114:709, Table 10-1 15), the DEIS makes no effort to examine the impacts on local governments and their residents of revenue reductions of this magnitude. Local governments provide a wide array of services including schools and pubic health programs. All of those programs could be at risk from limitations on the pollock harvest. And none of these consequences are considered in the DEIS.

Response: The commenter correctly identifies the available information on tax revenue impacts contained in the RIR. It is important to note that this information was gathered via special request from the Alaska Department of Revenue. NMFS requested a breakout of this data by community and/or ports. However, as stated in the RIR (page 501) "Unfortunately, confidentiality restrictions do not allow tax data to be shown for specific ports or communities." The Alaska Department of Revenue simply will not release the pollock specific tax impact data contained in the RIR at anything other than the aggregated level shown. Thus, is it is not possible to show community level tax effects.

Comment 10-61: The dependence of different communities on fish taxes to provide essential services to community residents will vary but, for many communities, it is very significant. Although the DEIS admits that these fishery dependent communities "rely heavily upon tax revenues associated with fishing activities" (DEIS at 705-706), the DEIS makes no effort to quantify or evaluate the impacts notwithstanding the fact that data is available. For example, in the City of Unalaska, the fishing industry accounts for over 90% of all jobs and, in FY 2006, the city's share of the two state fishery taxes plus the city's raw fish tax totaled $11,371,533, or 43% of the city's general revenues. Northern Economics 2009 at 55. In Akutan, over 70% of the community's tax revenue is pollock related. In King Cove that number is 20% and in Sand Point it is 50%.

Response: As noted in the response to comment 10-60, which is incorporated here by reference, it is not possible to disaggregate pollock fishery taxes to the community level without violating confidentiality restrictions. NMFS has identified the importance of these tax revenues at the regional level and has included estimated of impacts to tax collections under the alternatives in section 10-5.6.2 (page 708). NMFS does not dispute the importance of fishing industry jobs in dependent communities and has provided information compiled by ADOL on the seafood processing workforce and wage earnings in the Aleutian and Pribilof Islands region (Table 10-2, page 499).

Analysis of potential employment effects is problematic for several reasons. First, employment data for pollock harvesting sectors is not systematically collected. Thus, it is not possible, with presently available data, to equate potentially forgone revenue estimates with employment impacts. Second, there is no systematic data collection underway to document shoreside expenditures in the support sectors. Thus, it is not possible to equate estimated potentially forgone revenue with shoreside expenditures and subsequent effects on the services and support sectors. Third, employment in shoreside plants, though estimated by ADOL and reported in the RIR (page 499) is not reported specifically for pollock processing operations. Thus, it is difficult to determine the level of employment effects that might occur from potential contraction of the pollock fishery.

NMFS disagree with the assertion that data available in "Northern Economics 2009" was available to the analysts. The referenced report is dated January of 2009. The DEIS was made available to the public in December of 2008 and, thus, was completed prior to the availability of the Northern Economics report. In addition, the Northern Economics report is an industry funded analysis that provides coverage of the aggregated groundfish fishery but not specifically of the pollock fishery. Thus, specific effects on, and associated with, the *pollock* fishery cannot be directly determined from the information provided in the referenced report. Furthermore, the Northern Economics report is an industry funded study that only recently became available, is not published in a peer reviewed professional journal, and has not previously been vetted through, for example, the Council's Scientific and Statistical Committee. Thus, the Northern Economics report does not meet agency requirements for peer review under the Data Quality Act and cannot be considered "best scientific information" without meeting peer review requirements.

Comment 10-62: A salmon bycatch cap that could close the Bering Sea pollock fishery will have significant economic impacts on Alaskan communities, particularly villages in rural areas that have no way to offset revenue losses from the closure of such a significant fish as pollock. The impact of a drop in fish harvests is amply demonstrated by what happened to the City of St. Paul in the Pribilof Islands when Bering Sea snow crab landings fell. In 1999, the operating revenue for St. Paul was $11,672 per capita. When the snow crab fishery collapsed in 2000, St. Paul's operating revenue fell almost 50% to $6,491 per capita. Northern Economics 2009 at 55. The impact of that revenue loss on the City and its residents was enormous and some of the effects are felt in the community even today.

Response: NMFS does not dispute that a contraction in fishery landing will have economic impacts on fishing communities. The analysis of potentially forgone revenue contained in the RIR for the shoreside sector documents these potential effects. That analysis uses the total round weight equivalent first wholesale value derived from all pollock products processed by shoreside processors for each of the years analyzed divided by total retained tons of pollock harvested by catcher vessels delivering to shoreside processors. The price that results is inclusive of all processing value added to the first wholesale level by shoreside processing plants. Multiplication of this price by the potentially forgone pollock harvest estimated under the alternatives provides an estimate of impact that is inclusive of many community level impacts. In other words, the total value added at first wholesale level is inclusive of payment to labor and capital. It is; however, difficult with available information to disaggregate those effects. NMFS acknowledges that the presentation of this information in the DEIS is not sufficiently clear and will expand the discussion of community effects for Council final action and in the FEIS.

Comment 10-63: The DEIS makes no effort to examine the job losses that will occur because of lost revenues. It is elementary economics that when employers have less product to harvest, process, and sell (i.e., forgone revenue) they need fewer workers. Forgone revenue is not some abstract figure. It is a figure that means lost jobs. The DEIS, so concerned about increasing the subsistence harvest by one or two fish per household, ignores the fact that the price of that gain is that thousands of men and women will lose their jobs in the pollock industry and in the related and dependent support, service, and distribution sectors. And many of these people will be in economically stressed CDQ communities. The insensitivity of the DEIS to this aspect of Alternatives 2-4 is appalling. Having chosen to ignore the human impact of "forgone gross revenue," the DEIS also ignores the cascading impact of higher unemployment in terms of lower income tax revenues, reduced governmental services, increased unemployment compensation claims, and associated social costs.

Response: The proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as *potentially* forgone revenue or revenue *at risk*, depending on alternative. The RIR does not identify these impact estimates as *lost* revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Furthermore, the Council's stated preliminary preferred alternative modifies the strict hard cap formulations contained in Alternative 2 by including provisions for an industry managed Intercooperative Agreement (ICA provision) to reduce Chinook salmon bycatch to levels below the strict hard cap via industry derived incentives. Clearly, the Council's intent is to incentivize Chinook salmon bycatch avoidance in order to reduce it and the hard cap used in the potentially forgone revenue analysis is one part of the incentive. The implication is that the pollock industry will change behavior so that they do not face all of the potential forgone revenue, and/or revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

Analysis of potential employment effects is problematic for several reasons. First, employment data for pollock harvesting sectors is not systematically collected. Thus, it is not possible, with presently available data, to equate potentially forgone revenue estimates with employment impacts. Second, there is no systematic data collection underway to document shoreside expenditures in the support sectors. Thus, it is not possible to equate estimated potentially forgone revenue with shoreside expenditures and subsequent effects on the services and support sectors. Third, employment in shoreside plants, though estimated by ADOL and reported in the RIR (page 499) is not reported specifically for pollock processing operations. Thus, it is difficult to determine the level of employment effects that might occur from potential contraction of the pollock fishery.

The analysis of potential forgone revenue contained in the RIR for the shoreside sectors uses value data, and hence prices, that are inclusive of many community level impacts (see response to comment 10-62). In other words, the total value added at first wholesale level is inclusive of payment to labor and capital. It is; however, difficult with available information to disaggregate those effects. NMFS acknowledges that the presentation of this information in the DEIS is not sufficiently clear and will expand the discussion of community effects for Council final action and in the FEIS.

Comment 10-64: The Final EIS should include an analysis of the financial impacts on the ability of stakeholders to repay loans. Banking institutions that provide financing to companies and vessels engaged in the Bering Sea pollock fishery will be impacted in the tens of millions of dollars. For banking institutions to continue financing fishing operations, vessels must be able to generate sufficient cash flow to service debt. Likewise, companies engaged in servicing the fleet look to banks to fund their operations until the fleet is able to repay them for services rendered. Depending on the option chosen, caps might result in forgone pollock harvest worth hundreds of millions of dollars to the pollock industry. Such losses would have significant impacts in terms of lost revenues, jobs, and other economic activity including banks.

Response: Financing of operations via various banking arrangements, such as loans and operational lines of credit, are wholly proprietary arrangements. Thus, it is not possible to assess potential impacts on these functions. Furthermore, the purpose of the proposed action is to incentivize Chinook salmon bycatch reductions not to prematurely close the pollock fishery. To this end, the industry is expected to modify behavior to avoid Chinook salmon bycatch and, in so doing, mitigate potential forgone revenue. Further, reductions in pollock product supply may actually increase prices and total revenue, thereby improving the ability of pollock fishery participants to repay debt and this reality will be made clear in the FEIS.

Comment 10-65: Support sector businesses in pollock-dependent communities could be devastated by a restrictive hard cap on Chinook bycatch that could potentially close the pollock fishery.

Response: The purpose of the proposed action is to incentivize Chinook salmon bycatch reductions not to prematurely close the pollock fishery. To this end, the industry is expected to modify behavior to avoid Chinook salmon bycatch and, in so doing, mitigate potential forgone revenue. It is true that harvesting behavior changes may result in increased variable operating costs for pollock harvesting operations and such cost effects may actually result in greater shoreside support sector expenditures. NMFS acknowledges that the presentation of this type of information in the DEIS is not sufficiently and will expand the discussion of community effects for Council final action and in the FEIS.

Comment 10-66: The DEIS thoroughly analyzes the benefits of the proposed Chinook bycatch hard caps that are designed to provide additional fish for salmon fishermen in Western Alaska, however, the DEIS

is altogether lacking in any meaningful analysis of the direct and indirect economic consequences that could cost hundreds of millions of dollars in lost revenues for pollock-dependent communities in Southwest Alaska and the State of Alaska. Expand the analysis of the preferred alternative to include a full cost benefit analysis of the impacts to all areas of western Alaska, including all fisheries-dependent communities and CDQ groups, before the Council takes final action on the proposed Chinook bycatch amendment.

Response: NMFS does not agree with the assertion that the "DEIS is altogether lacking in any meaningful analysis of the direct and indirect economic consequences that could cost *hundreds of millions of dollars* in lost revenues for pollock-dependent communities in Southwest Alaska and the State of Alaska."

Shoreside processing sector potential forgone revenue impacts are estimated in the RIR and include impacts inclusive of value added processing and associated payments to labor and capital within communities. This is because the price used to estimate impacts on the shoreside sector is inclusive of all value added processing, at shoreside plants, to the first wholesale level (see response to comment 10-71). Thus, it is important to note that the analysis does include shoreside processing impacts, just not at the port or community level. Unfortunately, confidentiality restrictions prevents providing shoreside sector impacts at the port or community level.

Analysis of potential employment effects within communities is problematic for several reasons. First, employment data for pollock harvesting sectors is not systematically collected. Thus, it is not possible, with presently available data, to equate potentially forgone revenue estimates with employment impacts. Second, there is no systematic data collection underway to document shoreside expenditures in the support sectors. Thus, it is not possible to equate estimated potentially forgone revenue with shoreside expenditures and subsequent effects on the services and support sectors. Third, employment in shoreside plants, though estimated by ADOL and reported in the RIR (page 499) is not reported specifically for pollock processing operations. Thus, it is difficult to determine the level of employment effects that might occur from potential contraction of the pollock fishery.

The RIR also contains available information on tax revenue impacts. It is important to note that this information was gathered via special request from the Alaska Department of Revenue. NMFS requested a breakout of this data by community and/or ports. However, as stated in the RIR (page 501) "Unfortunately, confidentiality restrictions do not allow tax data to be shown for specific ports or communities." The Alaska Department of Revenue simply will not release the pollock specific tax impact data contained in the RIR at anything other than the aggregated level shown. Thus, is it is not possible to show community level tax effects, which would be a large component of state and local revenues the comments is asserting must be considered. NMFS has identified the importance of these tax revenues at the regional level and has included estimated of impacts to tax collections under the alternatives in section 10.5.6.1 and 10.5.6.2 (page 707 and 708).

Comment 10-67: The economic analysis must be expanded to consider the direct and indirect costs associated with each of the proposed alternatives before the Council takes final action. Specifically, the analysis should describe the impacts, in terms of lost revenues (including lost city and state tax revenue), jobs and other economic activity, for companies that provide goods and services to the pollock industry. Without a full understanding of the potential costs of the proposed alternatives, the Council will not have the information it needs to make an informed decision as to what the appropriate balance should be between the benefits that the proposed caps might provide to salmon fisheries on the one hand and the costs to the pollock fishermen and their related support industries on the other.

Response: As noted in the response to comment 10-60, which is incorporated here by reference, it is not possible to disaggregate pollock fishery taxes to the community level without violating confidentiality restrictions. NMFS has identified the importance of these tax revenues at the regional level and has included estimated of impacts to tax collections under the alternatives in section 10-5.6.2 (page 708).

Analysis of potential employment effects is problematic for several reasons. First, employment data for pollock harvesting sectors is not systematically collected. Thus, it is not possible, with presently available data, to equate potentially forgone revenue estimates with employment impacts. Second, there is no systematic data collection underway to document shoreside expenditures in the support sectors. Thus, it is not possible to equate estimated potentially forgone revenue with shoreside expenditures and subsequent effects on the services and support sectors. Third, employment in shoreside plants, though estimated by ADOL and reported in the RIR (page 499) is not reported specifically for pollock processing operations. Thus, it is difficult to determine the level of employment effects that might occur from potential contraction of the pollock fishery.

The purpose of the proposed action is to incentivize Chinook salmon bycatch reductions not to prematurely close the pollock fishery. To this end, the industry is expected to modify behavior to avoid Chinook salmon bycatch and, in so doing, mitigate potential forgone revenue. It is true that harvesting behavior changes may result in increased variable operating costs for pollock harvesting operations and such cost effects may actually result in greater shoreside support sector expenditures. NMFS acknowledges that the presentation of this information in the DEIS is not sufficiently clear and will expand the discussion of community effects for Council final action and in the FEIS.

Comments on the balance of costs and benefits

Comment 10-68: Perhaps the most telling statement in the DEIS is the admission that the bycatch of Chinook salmon in the pollock fishery "may" be affecting stocks of western Alaska Chinook and associated subsistence, commercial and sport fisheries. DEIS at 625. In a 762 page document, the DEIS can only conclude there "may" be an effect. Had the DEIS done a complete analysis, it would have found that the adverse effects it assumes "may" exist are illusory or of no measurable significance. In stark contrast, the DEIS admits that the proposed restrictions on the pollock fishery will have clear and identifiable adverse impacts that reach up to $500,000,000 in lost revenue. However, had the DEIS done a complete and accurate analysis, it would have found that these adverse economic impacts were significantly and measurably understated in the DEIS. The actual impact to the nation is well over $1 billion. Had the DEIS done a complete analysis as required by NEPA, it would have found that these numbers mask the impact of job losses. Had the DEIS done a complete and accurate analysis, it would also have found that the proposed restrictions on the pollock fleet will impose severe hardships on economically disadvantaged CDQ communities, many residents of which find CDQ related jobs as an alternative to subsistence.

Response: The comment opens with a statement of fact. Based upon the best available scientific information, the most NMFS is able to assert is "that the bycatch of Chinook salmon in the pollock fishery 'may' be affecting stocks of western Alaska Chinook and associated subsistence, commercial, and sport fisheries." Our knowledge of these complex ecological, biological, and economic relationships remains incomplete at this time. That being said, these data deficiencies do not remove the Agency's obligation to use the "best available scientific information" to evaluate, in this case, Chinook bycatch reduction alternative actions in the BSAI pollock fisheries. Whether impacts on western Alaska-source

Chinook, attributable to bycatch losses in the pollock fisheries, are "illusory or of no measurable significance", as asserted by the commenter, is first and foremost a policy determination. Essentially, the Secretary of Commerce, with advice from the Council, must decide what society is "willing-to-pay", in terms of numbers of Chinook salmon lost to bycatch, to harvest the pollock TAC. Monetized, quantified, and/or qualitative descriptions of the suite of likely impacts (positive and negative) are mandated by law and executive order, to inform the decision-makers and the public of the expected trade-offs being contemplated. Armed with this analysis, and other relevant information, the Secretary of Commerce, on behalf of the American people, will weight the relative importance of competing needs and interests on making a final decision. What one group may regard as illusory or of no measurable significance, others may weight as critically important.

The comment misinterprets the numerical estimates of "potentially forgone gross revenues" and "gross revenues at risk", identified in the RIR. As explained therein, these gross estimates reflect highly simplified assumptions about the outcome of competing alternative bycatch rules. In a sense, they are intended to portray the "worst case" outcome if the pollock fishery was required to forgo a specific catch amount in response to each of the Chinook bycatch prohibition actions being examined. As the text clearly indicates, there is no expectation that this outcome will be realized as a result of any of the proposed Chinook bycatch management measures under consideration. The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states "As noted above, gross revenues at risk are forgone only if a fishing fleet is unable to modify its operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere ..." The analysis goes on to address the expected results of less extreme catch reduction levels, resulting from industry changes in operational practices (e.g., gear changes, location changes, timing changes). In every case, the RIR emphasizes that these estimates are incomplete, owing to the absence of industry cost and operational data, market information, pricing structure, etc. As "gross revenue" measures, these numerical results cannot even be interpreted as being indicative of the net impacts the industry could be expected to incur as a result of implementation of any one of the several bycatch alternatives. The commenter's assertion that the "actual impact to the nation is well over $1 billion", is simply not subject to objective evaluation, given available data.

Finally, NMFS disagrees that the RIR has not addressed the adverse impacts that may accrue to CDQ communities, although those impacts could have been more effectively presented. NMFS will revise the presentation of impacts on communities, including explicit treatment of CDQ communities, in the subsequent draft document.

Comment 10-69: Healthy pollock resources off Alaska provide benefits to the State of Alaska. Further work is needed to improve stock of origin and age distribution estimates of Chinook salmon taken in the pollock fishery and to better understand the relationship of Chinook salmon encounters in the pollock fishery with abundance.

Response: NMFS acknowledges the comment.

Comment 10-70: Given all that is missing from the putative analysis of costs and benefits contained in the analysis, it strains credulity to read that any action taken to reduce salmon bycatch in the pollock fishery" will result in an aggregate welfare improvement to society, offsetting any apparent welfare reduction in the retail/wholesale domestic seafood/fish products commercial marketplace." DEIS at 702.

Response: NMFS is the first to agree that the quality, quantity, and availability of reliable, verifiable, and consistent cost and benefit data, supported by empirical studies of key aspects of: [1] the commercial pollock fishery, [2] those of Chinook salmon users and uses, and [3] their intersection within the context of Chinook bycatch in the BSAI pollock fisheries, are severely limited. Notwithstanding these "facts", NMFS is required by law to utilize the "best available data and information", supported by relevant theory, interpretation, and accepted practice, to prepare an objective analysis of the expected costs and benefits (and, in addition, their likely distribution) across users and uses. Whenever meaningful quantification of such benefits and costs can be made, NMFS has done so. When quantification is not feasible, all relevant costs and benefits must still be considered, even if only qualitatively. Only through a systematic and comprehensive accounting of every relevant economic and socioeconomic element of the proposed suite of actions can the public be informed of the trade-offs it is contemplating. That is, the RIR is intended to inform, to the fullest extent practicable, the public (and those charged with decision making on their behalf) of the costs and benefits that can be anticipated from each competing alternative action being considered... and to whom each is likely to accrue. NMFS believes it has prepared an analysis that meets both the spirit and letter of this mandate. NMFS does acknowledge that portions of the analytical presentation would benefit from reorganization, and intends to undertake these changes in the subsequent draft.

Comments on the forgone revenue analysis

Comment 10-71: The use of 2005 or 2006 prices in Chapter 10 significantly understates the value of the pollock fishery in Alaska. The market data, including wholesale price data, cited in Chapter 10 is taken from the "2007 Economic SAFE Report." Wholesale prices, and hence, the wholesale value of the fishery, are derived from product prices through 2005, or at best, 2006. Given that prices for fillets made from U.S. pollock have increased substantially since 2006, the use of 2005 or 2006 prices significantly understates the value of the pollock fishery in Alaska. The product market values used in Chapter 10 to calculate forgone revenues greatly understates recent pricing and consequently, even the limited forgone revenue analysis makes projections that are far below predicted actual losses. The DEIS's computations grossly underestimate the revenue loss to the pollock fishery caused by Alternatives 2-4.

Response: The analysis of potential forgone revenue has estimated the date on which the pollock fishery would have hit the various Chinook salmon bycatch caps in each of the years 2003-2007 in order to conduct a retrospective analysis to answer the question of what would have happened had the proposed action been in place in those years. The estimate of potentially forgone pollock harvest that results is then multiplied by a price to estimate potentially forgone revenue. Since the impact estimate is calculated in terms of the metric tons of pollock catch potentially forgone, it is necessary to use a price that is reflective of the total value of that catch. This process is necessarily complicated by the fact that pollock is processed into several product forms, not just fillet block, and is processed both at sea (CPs and Motherships) and in shoreside processing facilities that receive deliveries from Catcher Vessels. Thus, reported values in the offshore sector (CPs and Motherships) are inclusive of all processing value added to the first wholesale level, which is also the point of departure for export of pollock products. And, as has been pointed out in responses to comment 10-46, effects in export markets are not an appropriate consideration in a RIR. Thus, this is a logical level at which to value potential impacts because exports and effects on export markets is exogenous to this level of valuation. Further, potential welfare impacts in domestic markets cannot be determined with available data (see response to comment 10-83). Thus, first wholesale value is an appropriate value to capture the total quantifiable domestic market effect on potential forgone pollock harvest and revenue.

The analysis is complicated by the fact that deliveries to shoreside plants by Catcher Vessels are paid an ex-vessel price that is considerably less than, and thus not comparable to, the first wholesale value. To provide comparable first wholesale values for both the offshore and inshore sectors, the analysis does not use ex-vessel value and, instead, calculates a shoreside sector price that is inclusive of all processed value added. This is done by annually aggregating the total value of all pollock products processed by shoreside processors, as reported by industry to NMFS in the COAR report and compiled by the Alaska Fisheries Science Center, and dividing that value by the total round weight of retained metric tons of pollock harvested by Catcher Vessels in the Bering Sea pollock fishery as reported in the e-landings catch accounting system.

This calculation provides a round weight equivalent first wholesale value for the shoreside sector that can be multiplied by estimates of potentially forgone pollock harvest, in round metric tons, to determine potentially forgone revenue at the first wholesale level. This is done annually from 2003 through 2006 in the RIR for each of the sectors and these prices are reported in Tables 10-81 and 10-82 (page 655). These are the prices that are applied by year for each year from 2003 through 2007. Note however, that the 2007 price was not yet available when the analysis was completed for the DEIS. Updated pricing data for 2007 has been obtained and will be provided to the Council prior to final action and will be updated in the FEIS as well.

NMFS disagrees with the assertion that the prices used are outdated and underreport pollock impacts. The total valuation used in the analysis is that provided by industry. Further, it accounts for the first wholesale value of all product forms, not just the highest valued product forms. Finally, it is applied at a level that is consistent across sectors and complies with agency obligations under Executive Order 12866.

Comment 10-72: Chapter 10 relies on outdated wholesale values as the indicator of the value of the investment at risk in the pollock industry and ignores employment in the industry and support sectors, fuel costs, government benefits, and so on. The analysis uses out of date wholesale values when current values are available. Chapter 10 relies on outdated wholesale values as the indicator of the value of the investment at risk in the pollock industry and ignores employment in the industry and support sectors, fuel costs, government benefits, and so on. The analysis uses out of date wholesale values when current values are available. Chapter 10's estimate of forgone wholesale revenue understates the loss by 49%-69% because Chapter 10 uses prices that no longer reflect the marketplace. The Urner Barry Price Report, a widely respected and relied upon data source, shows that pollock fillet block prices have increased 49% since 2006 and 69% since 2005. This increase is confirmed by the rise in prices for exported product. The two largest European destinations for pollock fillets are Germany and the Netherlands. Between 2005 and 2008, the price of Alaska pollock fillets exported to the Netherlands FOB Alaska increased from $0.99 to $1.53 per pound (63%). In Germany, the price FOB Alaska increased in the same years from $1.05 to 1.65 per pound (64%). These export prices understate the price of pollock fillet blocks because there are piece block and lower price items included. In other words, computation of forgone wholesale revenue is significantly underestimated because Chapter 10 fails to use the best and most current data. Even using outdated prices that underestimate forgone revenue by 49% - 69%, Chapter 10 states that the proposed bycatch reduction measures could cost up to $500,000,000. DEIS at 656-687.

Response: See responses to comments 10-85, and 10-60, which are incorporated by reference here.

Comment 10-73: Pollock accounts for more than one-third of all U.S. fisheries landings by volume. Northern Economics Inc., The Seafood Industry in Alaska's Economy, January 2009 ("Northern Economics 2009") at ES 2, 18. In 2007, the first wholesale value of the pollock harvest was $1.248 billion. DEIS at ES 2. However, this number does not reflect the multiplier effect of additional economic

activity generated by the pollock fishery. The U.S. seafood industry generates an additional $600,000 in direct and indirect outputs for every $1 million of wholesale value. See, The Seafood Industry in Alaska's Economy, a recent report by Northern Economics, Inc, January 2009, at p. 44. Thus, the 2007 dollar value of Alaska's pollock fishery to the nation was $2.029 billion. And that number understates current value because wholesale pollock prices increased in 2008. The forgone revenue analysis does not include any consideration of this economic multipliers that are associated with revenue generated from the fishing industry in Alaska.

Response: Executive Order 12866 clearly defines the cost-benefit framework of applied welfare economics as the appropriate analytical framework for assessing impacts of Federal regulations. Multiplier analysis is derived generally from models that account for the flow of transfers of goods and services in an economy and are not consistent with the cost-benefit theoretical framework. In fact, multiplier, or Input-Output analysis as it is called, is not identified in the Executive Order.

Further, the referenced multiplier estimate is not specific to the pollock fishery and is not specific to the Bering Sea region. It is a statewide multiplier that combines all sectors of the seafood industry together. In addition, the Northern Economics report is an industry funded analysis that provides coverage of the aggregated groundfish fishery but not specifically of the pollock fishery. Thus, specific effects on, and associated with, the *pollock* fishery cannot be directly determined from the information provided in the referenced report. Furthermore, the Northern Economics report is not published in a peer reviewed professional journal, and has not previously been vetted through, for example, the Council's Scientific and Statistical Committee. Thus, the Northern Economics report does not meet agency requirements for peer review under the Data Quality Act and cannot be considered "best scientific information" without meeting peer review requirements.

Comment 10-74: The second reason Chapter 10 grossly underestimates the actual forgone revenue caused by adopting Alternatives 2-4 is that it does not include all the items that must be accounted for in calculating revenue loss to the nation. Chapter 10 completely ignores the multiplier effects of economic activity. Chapter 10 defines the term "forgone lost revenue" as the "revenue that the fleet, or sectors within it, would be allowed to earn...." DEIS at 656. This definition alone documents the incomplete and inadequate analysis in Chapter 10. Chapter 10 fails to recognize, and therefore excludes, the economic multipliers associated with this revenue loss. Applying these multipliers, the loss to the nation approaches $1 billion using Chapter 10's outdated wholesale revenue calculations. Using current wholesale prices, the loss to the nation is well over $1 billion.

Response: Executive Order 12866 clearly defines the cost-benefit framework of applied welfare economics as the appropriate analytical framework for assessing impacts of Federal regulations. Multiplier analysis is derived generally from models that account for the flow of transfers of goods and services in an economy and are not consistent with the cost-benefit theoretical framework. In fact, multiplier, or Input-Output analysis as it is called, is not identified in the Executive Order.

Comment 10-75: Using forgone revenue as a measure of the economic impact of the premature closure of the BSAI pollock fishery is a gross over simplification that significantly understates the economic consequences of the proposed alternatives under consideration. fails to inform the Council, the agency and the public of the true distributional and other impacts that such closures would have on: seafood production, international trade and the US balance of payments, jobs, markets, consumers, support industries (e.g., banks, fuel suppliers, shipping companies, equipment manufacturers, cold storages, airlines, travel agencies and other such vendors who supply goods and services to the industry), invested capital, and a host of other consequences that would flow from such a closure.

Response: NMFS acknowledges that the use of potentially forgone first wholesale gross revenues is not an ideal reflection of the expected economic costs (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in Chinook bycatch management. An explanation of the reasons for adopting this analytical approach is summarized in response to comment 10-83 and is included here by reference.

In order to estimate "profits", one must have data on costs, not simply revenues. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. In the absence of these data, it is possible only to report empirical estimates of gross revenues. These gross receipts may, of course, not be, in any meaningful way, indicative of realized net revenues, but by default serve as the best available "proxy" for economic earnings in these fisheries.

It must also be noted that "maximizing profit" is only one, among several possible motivating factors that may be "assumed" to define the objectives of a business enterprise.

Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration. And, further, this explains the very extensive reliance upon, and systematic treatment of, "qualitative" cost and benefit analysis, reflected in the RIR, as required under E.O.12866.

Comment 10-76: Chapter 10 overstates the impact to pollock fleet as there is sufficient certainty about behavior changes. Industry will not sit passively when a hard cap is in place. In developing their ICAs, they have already identified a grocery list of options to help them remain below a hard cap. Clearly, saving will occur. Even in 2007, it may have been possible to stay under a 68,392 hard cap. To do that the industry would use the fixed A season closure, and not fish in late September and October. The increased closure areas in the 2008 VRHS system would have saved additional salmon, and that curtailing the fishery in late September probably wouldn't have been necessary. Adding a hard cap would surely have incentivized the fleet to not fish around the edges of closures, etc., which would make staying under the hard cap fairly easy for the average performer. More importantly, per Kochin et al., "A hard cap of 47,591 appears to be a reasonable balance between protecting Chinook salmon and allowing the pollock fishery to be harvested." We feel that taking additional measures to get down to that level, while difficult, is a reasonable goal. Mostly, substandard performers are going to have to mend their ways. The fleet will have to make Chinook avoidance a priority. Given the situation in western Alaska, we feel that is warranted.

Response: NMFS acknowledges the opinions expressed in the comment. NMFS disagrees with the comments that the estimates of impact to the pollock fleet are overstated. As explained in the RIR, these gross estimates reflect highly simplified assumptions about the outcome of competing alternative bycatch rules. In a sense, they are intended to portray the "worst case" outcome if the pollock fishery was required to forgo a specific catch amount in response to each of the Chinook bycatch prohibition actions being examined. As the text clearly indicates, there is no expectation that this outcome will be realized as a result of any of the proposed Chinook bycatch management measures under consideration. The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first

wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states "As noted above, gross revenues at risk are forgone *only* if a fishing fleet is unable to modify its operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere

Comment 10-77: Parts of the pollock industry may struggle to harvest their TAC share under PPA2, but most operators will be impacted far less than Chapter 10 suggests. Using a retrospective analysis similar to that used in Chapter 10, but assuming savings similar to those suggested by Kochin et al., shows that only seasons similar to 2006 and 2007 A seasons would have been challenging. A 47,591 hard cap would focus the necessary minds on the problem of Chinook bycatch and the likelihood of forgone harvest is low.

Response: The analysis of impacts of the PPAs, in terms of potentially forgone revenue is presented in table 10-99 and 10-100 of the RIR (pages 675 and 676). This analysis shows, as the commenter has pointed out, that there are potential impacts to the A season pollock fishery in 2003, 2006, and 2007. In the B season, potential impacts are spread across 2004, 2005, 2006 and 2007, depending on rollover provisions. As discussed in the response to comment 10-46, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as *potentially* forgone revenue or revenue *at risk*, depending on alternative. The RIR does not identify these impact estimates as *lost* revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch.

Comment 10-78: The pollock industry will react to a hard cap by mending their behavior. The better performing cooperatives do enough better than the average that their losses would be far less than their prorata share of the Chinook salmon bycatch. The worst performers should be able to match the best.

Response: NMFS acknowledges the comment.

Comment 10-79: The industry will make considerable efforts to avoid Chinook when faced with a hard cap. Using historic bycatch with no savings due to avoidance measures greatly overstates the impact of a hard cap. The industry could have stayed under a hard cap of 68,600 if they'd had the current VRHS system, including the fixed A season closure in place, and had not fished in October.

Response: The analytical timeframe of 2003 through 2007 was chosen because it represents a range of Chinook salmon bycatch conditions that accurately represent the status quo conditions. Those status quo conditions include observed high levels of Chinook salmon bycatch under present regulations that provide an exemption to Chinook salmon savings area closures for operators that participate in the Voluntary Rolling Hotspot System (VRHS). The analytical period encompasses years when the voluntary rolling hotspot system was in place, either via industry initiative, via an experimental fishery, or as a formal program under present regulations. Thus, NMFS does not agree with the implication that the analysis did not include effects of the VRHS.

Comment 10-80: While we recognize the limits the analysts must deal with, using gross wholesale value for any forgone harvest as the primary metric greatly overstates the impact of forgone harvest. Earnings Before Interest, Taxes, Depreciation and Amortization or EBITDA per marginal ton is far more useful for evaluating the impacts to the direct participants. If a measure of impact to indirect participants is needed that should be developed separately.

Response: EBITDA is a measure of net income calculated by subtracting expenses (excluding tax, interest, depreciation, and amortization), from revenue. Thus, calculating EBITDA requires information on cost of production, which is not available for the pollock fishery. NMFS does not necessarily disagree that, were cost data available, the EBITDA measures would be a potential representation of effects on net income. However, it is also important to recognize that, as discussed in the response to comment 10-46, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as *potentially* forgone revenue or revenue *at risk*, depending on alternative. The RIR does not identify these impact estimates as *lost* revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Thus, NMFS does not agree with the assertion that the analysis overstates impacts.

Comment 10-81: The "forgone revenue" test in Chapter 10 is simply inadequate to inform the Council of the economic consequences that would flow from the adoption of a cap that the industry cannot practicably accommodate the "practicability" test imposed by National Standard 9's bycatch reduction requirement. The Guidelines for National Standard 9 specifically require that consideration be given to "Changes in the distribution of benefits and costs" in determining whether or not bycatch reduction measures are "practicable" (See, National Standard Guidelines, 50 CFR. 600.350 (3)(1)). The forgone revenue test does not enable the Council to make such determinations.

Response: NMFS's guidelines for National Standard 9 provides that any determination of whether a conservation and management measure minimizes bycatch or bycatch mortality to the extent practicable should consider 10 factors, one of which is the "Changes in the distribution of benefits and costs." 50 C.F.R. § 600.350(d)(3)(i) (I). The other factors include:

> population effects for the bycatch species; ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem); changes in the bycatch of other species of fish and the resulting population and ecosystem effects; effects on marine mammals and birds; changes in fishing, processing, disposal, and marketing costs; changes in fishing practices and behavior of fishermen; changes in research, administration, and enforcement costs and management effectiveness; changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources; and social effects.

NMFS acknowledges that the use of potentially forgone first wholesale gross revenues is not an ideal reflection of the expected economic costs (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in Chinook bycatch management. An explanation of the reasons for adopting this analytical approach is summarized in response to comment 10-83 and is included here by reference.

In order to estimate "profits", one must have data on costs, not simply revenues. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. These gross receipts may, of course, not be, in any meaningful way, indicative of realized net revenues, but by default serve as the best available "proxy" for economic earnings in these fisheries.

It must also be noted that "maximizing profit" is only one, among several possible motivating factors that may be "assumed" to define the objectives of a business enterprise. The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states

"As noted above, gross revenues at risk are forgone only if a fishing fleet is unable to modify its operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere ..." The analysis goes on to address the expected results of less extreme catch reduction levels, resulting from industry changes in operational practices (e.g., gear changes, location changes, timing changes). In every case, the RIR emphasizes that these estimates are incomplete, owing to the absence of industry cost and operational data, market information, pricing structure, etc. As "gross revenue" measures, these numerical results cannot even be interpreted as being indicative of the net impacts the industry could be expected to incur as a result of implementation of any one of the several bycatch alternatives.

In addition, the proposed action is not intended to close the pollock fishery; it is intended to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as potentially forgone revenue or revenue at risk, depending on alternative. The RIR does not identify these impact estimates as lost revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch. Furthermore, the Council's stated preliminary preferred alternative modifies the strict hard cap formulations contained in Alternative 2 by including provisions for an industry managed Intercooperative Agreement (ICA provision) to give the industry flexibility in complying with the hard cap. Clearly, the Council's intent is to incentivize Chinook salmon bycatch avoidance in order to minimize it to the extent practicable and the hard cap used in the potentially forgone revenue analysis is one part of the incentive. The implication is that the pollock industry will change behavior so that they do not face all of the potential forgone revenue, and/or revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration. And, further, this explains the very extensive reliance upon, and systematic treatment of, "qualitative" cost and benefit analysis, reflected in the RIR, as required under E.O.12866.

Comment 10-82: By assuming no change in behavior on the part of the pollock fleet in response to possible closure before the TAC is harvested, the methodology is patently false, and this is explicitly recognized in the DEIS. Citing a lack of good data, however, the DEIS refuses to explore the impacts of a reasonable range of increased costs of the fleet of catch all or most of the TAC. Instead, the DEIS offers an approach that systematically exaggerates the costs of bycatch reduction by a very large, but indeterminate amount, and ultimately mislead any effort to understand the impacts of the alternatives.

Response: The comment misinterprets the numerical estimates of "potentially forgone gross revenues" and "gross revenues at risk", identified in the RIR. As explained therein, these gross estimates reflect highly simplified assumptions about the outcome of competing alternative bycatch rules. In a sense, they are intended to portray the "worst case" outcome if the pollock fishery was required to forgo a specific catch amount in response to each of the Chinook bycatch prohibition actions being examined. As the text clearly indicates, there is no expectation that this outcome will be realized as a result of any of the proposed Chinook bycatch management measures under consideration. The RIR is very clear that these "techniques" are employed solely to provide a crude approximation of the first wholesale gross dollar value associated with unharvested pollock, by sector, processing mode, etc. On page 656, the text states "As noted above, gross revenues at risk are forgone only if a fishing fleet is unable to modify its

operations to accommodate the imposed (Chinook bycatch) limits and, thus, cannot make up displaced catches elsewhere ..." The analysis goes on to address the expected results of less extreme catch reduction levels, resulting from industry changes in operational practices (e.g., gear changes, location changes, timing changes). In every case, the RIR emphasizes that these estimates are incomplete, owing to the absence of industry cost and operational data, market information, pricing structure, etc. As "gross revenue" measures, these numerical results cannot even be interpreted as being indicative of the net impacts the industry could be expected to incur as a result of implementation of any one of the several bycatch alternatives.

Comment 10-83: The purpose of the DEIS is to provide decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative measures to minimize Chinook salmon bycatch in the Bering Sea pollock fishery. As such, it's theoretical basis and methods should correspond to those generally accepted and employed by practitioners of applied welfare economics. The main components of welfare economics can be summarized as the concepts of producer and consumer welfare and the development of methods for their measurement. Producer welfare concepts include producer surplus, economic rent, and profits. Consumer welfare concepts include primarily product demand curves, consumer willingness to pay, and consumer surplus. The DEIS contains very little of substance concerning these concepts and their measurement. On these grounds alone, it simply cannot be considered a sufficient or satisfactory accounting of the changes in producer and consumer welfare that are likely to accompany the alternative management measures contemplated to reduce Chinook salmon bycatch. It provides very little if any useful input into the policy-making process as regards potential welfare changes to U.S. citizens.

Response: NMFS acknowledges the absence of empirical estimates of consumer surplus and producer surplus changes that might be expected in response to one or another of the suite of proposed Chinook bycatch management actions. The ability to mathematically derive these welfare measures in fundamentally dependent upon empirical data on, among others, input prices, costs, capital investment, debt service, consumer demand, sources of supply, market structure, substitutes and complements, measures of consumer responsiveness to changes in price, quantity, quality, income, tastes, and preferences. Exogenous factors also influence rigorous derivation of these welfare measures, such as, currency exchange rates, tariffs, political and economic instability. Very few of these necessary data are available to NMFS, at present. Similarly, economic modeling, specific to Chinook bycatch in the BSAI pollock fishery, is also presently unavailable, although work is underway at NMFS Alaska Fisheries Science Center on aspects of these analytical needs. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. At present, the analysts must employ methods and strategies predicated on extremely limited data and virtually non-existent economic modeling of these resources and uses.

Confronted with these facts, NMFS is nonetheless legally obligated to analyze, to the fullest extent practicable, the benefits and costs (as well as their expected distribution) of the proposed management actions being considered. These mandates (e.g., E.O.12866, OMB Circular A-4, MSA) recognize and explicitly provide for adoption of analytical strategies and approaches to evaluating benefits and costs in the absence of fully adequate empirical data and quantitative models. These provisions can be found in the introductory paragraphs of the RIR, describing Executive Order 12866 procedural requirements. The subject RIR adheres to these requirements.

Comment 10-84: The DEIS adopts forgone pollock revenue as its measure of the costs and benefits to the pollock fishery of the alternative bycatch management options under consideration. Adoption of

forgone pollock revenue as a measure of costs and benefits is misleading because the measure is neither a cost nor a benefit. Additionally, this measure bears no direct relationship to generally accepted concepts of producer welfare that have been in use since the 1940s.

Response: NMFS acknowledges that the use of forgone first wholesale gross revenues is not an ideal reflection of the expected economic costs (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in Chinook bycatch management. An explanation of the reasons for adopting this analytical approach is summarized in response to comment 10-83 and is included here by reference. Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration. And, further, this explains the very extensive reliance upon, and systematic treatment of, "qualitative" cost and benefit analysis, reflected in the RIR, as required under E.O.12866.

Comment 10-85: Even the most introductory text on welfare economics will point to profits as the most obvious measure of producer welfare, given that maximizing profit is the assumed objective of any business enterprise. No discussion of pollock producer profits or their relationship to forgone revenues appears in the DEIS. Evidently it is the opinion of the DEIS that the statement on page 264 is sufficient to support the omission of any serious discussion of producer welfare concepts and changes other than forgone pollock revenues.

Response: NMFS notes that even the most introductory text on welfare economics will also recognize that, in order to estimate "profits", one must have data on costs, not simply revenues. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. In the absence of these data, it is possible only to report empirical estimates of gross revenues. These gross receipts may, of course, not be, in any meaningful way, indicative of realized net revenues, but by default serve as the best available "proxy" for economic earnings in these fisheries.

It must also be noted that "maximizing profit" is only one, among several possible motivating factors that may be "assumed" to define the objectives of a business enterprise.

Comment 10-86: The discussion of variable cost changes in the DEIS contains no discussion of the concept of rent as it relates to changes in producer welfare. DEIS at 695-697. An alternative to profit, defined by Marshall as the excess of gross receipts over their prime cost --- that is, over the extra cost that the firm incurs in order to produce those things which it could have escaped if it had not produced them, is termed rent. Marshall. A., Principles of Economics, 1930. The concept is called rent because it is a rent on fixed factors employed by the firm but, unlike factor rent, may not persist over a long period of time. Specifically, rent is defined as the excess of gross receipts over total variable costs. Marshall went on to suggest the area below the price line and above the supply curve, commonly called producer surplus, as a measure of this benefit.

Response: The comment correctly identifies the concept of "rents" (also termed quasi-rent) in the context of marginal productivity theory. Quantitative estimation of rents requires comparison of a firm's gross revenues and its costs. As the commenter also notes, the graphic representation of this economic concept is approximated (at least under specific assumptions) by the area above the supply curve, below

the price line (i.e., producer's surplus). As has been explained in the RIR, and treated elsewhere in the response to comments, fixed and variable cost data are not available for use in this impact analysis. Absent firm-level cost data, empirical estimation of changes in producer's surplus, or quasi-rents, or the Marshallian expression of "rent" (referenced in the comment), is not possible. The RIR does, notwithstanding the empirical limits on estimation, explicitly treat the topic of "producer's surplus" impacts and their relevance to an evaluation of the Chinook bycatch reduction action alternatives. Therefore, NMFS finds that the absence of an explicit use of the term "rents" does not constitute a deficiency in the document.

Comment 10-87: If the DEIS had informed the public as to the nature and composition of producer welfare measures, then it might have been discovered that the pollock CDQ groups collect royalty payments from the lease of pollock harvest privileges, and that these royalty payments could be used as a basis for approximating changes in producer welfare (profits or rent) due to the alternative management measures. A very simple assumption in this regard would be that producer rents are approximately twice the annual per-ton pollock lease values received by the CDQ groups (i.e., it could be assumed that a competitive negotiation leads to an approximate splitting of the rents). NMFS has access to information on pollock lease values received by the CDQ groups to fulfill its responsibilities as regards CDQ program administration and oversight. The advantage of this approach is that it does not mislead the public by (1) declaring that a revenue is a cost, and (2) stating that the analysis is based on the best available science and data.

Response: The commenter makes an interesting observation. However, contrary to the assertion that NMFS has access to CDQ pollock lease data, the agency actually received information about royalties paid, by species or species group, for the CDQ allocations only until 2005. NMFS lost the authority to require the accurate submission of annual reports that provided this specific information, as a result of the 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act. For 2006 and beyond, NMFS has been limited to reliance upon unverifiable information about royalties, published by the CDQ entities in annual reports prepared primarily for residents of the member communities. These annual reports are available to the public. Some of the CDQ entities choose to include specific information about royalties, while others choose not to provide this level of detail in their annual reports.

On the technical reasoning presented in the comment, NMFS agrees that, if consistent, comprehensive, and reliable data were currently available, CDQ royalty payments might be employed as a baseline "proxy" from which to extrapolate rents, although only within the CDQ-portion of the pollock directed fishery. It is less clear that these results, were they amenable to estimation, would be generalizable across the majority of the pollock fishery (i.e., the non-CDQ seasons). Historically, CDQ allocations have been available for harvest during periods and in areas not open to non-CDQ operations. Precisely how these factors would impact accrual of rents is, by-in-large, purely speculative. It also suggests that the use of royalty payments to approximate resource rents could, under the best of circumstances, only inform one of the gross magnitude of "rents" uniquely attributable to CDQ pollock harvests in that time period/area. That is, if CDQ pollock is taken where and when non-CDQ fishing is closed, it could be argued, its value (and, thus, any rent generated) is not generalizable to periods when commercial fishing is occurring. While this represents an interesting hypothesis to contemplate, empirical evaluation would require data which are not currently available for use in this analysis. NMFS also recognizes that fractional ownership interests (and other forms of "affiliation") are not well documented in available data, making interpretation of the "selectively" (and wholly voluntarily) reported CDQ royalty payment information difficult to objectively assess.

Comment 10-88: Although changes in producer profits are a useful measure of changes in producer welfare for many regulatory changes, this is not the case for a policy change that prevents a firm from producing during a period. In such case, a firm would be willing to pay more than its current profits to remain in production because its fixed costs cannot be avoided even if production is shut down. The DEIS discussion regarding fixed costs contains no discussion of this concept as it relates to changes in producer welfare. DIES at 693.

Response: NMFS agrees that regulatory closure of the pollock fishery during a period when fishing would otherwise voluntarily occur requires an operator to incur the full fixed cost of that period of inactivity. This outcome represents precisely the economic incentive to avoid Chinook bycatch in the pollock fishery that the Council envisioned for this action. A more elaborate treatment of the theory of production under output constraints is unnecessary.

Fundamentally, it does not matter whether, as the comment asserts, "... a firm would be willing to pay more than its current profits to remain in production...", if it fails to remain under the Chinook bycatch cap. In effect, society has expressed its "willingness-to-pay" (i.e., its maximum tolerance for losses of PSC to bycatch) as a fixed "cap" on Chinook bycatch mortality. If a firm (or, as appropriate, sector, industry) exceeds that threshold, it must cease operation, incurring whatever costs (e.g., fixed, variable, penalties, fines) that may accrue, no matter what the "price it would be willing to pay to continue operation". This is, after all, the purpose of PSC limits and, in the present context, the unambiguous source of the economic incentive for pollock operators to undertake any action required to remain below that Chinook bycatch closure threshold.

Comment 10-89: After admitting the PPA will result in forgone catch, Chapter 10 fails to examine the economic impact of lost harvest on the economics of catcher vessels, catcher processors, and onshore processors. For example, many processing facilities were constructed based on economic assumptions associated with a certain product throughout. Reductions in the pollock harvest forced by salmon bycatch restrictions could fundamentally alter the basic economic viability of many parts of the pollock fishery - and that too will be reflected in lower wages and lost jobs.

Response: NMFS disagrees with the assertion that the analysis "fails to examine the economic impact of lost harvest on the economics of catcher vessels, catcher processors, and onshore processors." The analysis contained in the RIR provides estimates of potentially forgone revenue, under the PPA, for the Catcher Processor sector, the Mothership Sector, and the Shoreside sector a the first wholesale level of economic value. This analysis is conducted retrospectively by year for 2003-2007 and provides seasonal breakout, CDQ breakout, the effect of transferability provisions and the effects of rollovers on the estimated potential forgone revenue. This information is included in the RIR beginning on page 675 and is documented in tables 10-99 through 10-102.

It is important to note that shoreside processing sector potential forgone revenue impacts estimated in the RIR, are embedded within the overall shoreside sector impacts. That is, both the Catcher-Vessel impacts and the shoreside processor impacts are combined at the first wholesale level (See response to comment 10-71 for justification of this methodology). This is because the price used to estimate impacts on the shoreside sector is inclusive of all value added processing, at shoreside plants, to the first wholesale level. Thus, it is important to note that the analysis does include shoreside processing impacts, just not at the port or community level. Confidentiality prevents taking the shoreside Impacts to the port or community level.

As has been stated in the response to comment 10-46, the proposed action is not to close the pollock fishery it is to incentivize the avoidance of Chinook salmon bycatch and that is why the impacts are reported as *potentially* forgone revenue or revenue *at risk*, depending on alternative. The RIR does not identify these impact estimates as *lost* revenue specifically because mitigation of the impacts via harvesting behavior changes are expected as that is the point of incentivizing avoidance of prohibited species bycatch.

Comment 10-90: The forgone revenue analysis does not adequately in form the Council as to the costs associated with management measures that could result in premature closures of the pollock fishery. Using forgone revenue as a measure of the economic impact of the premature closure of the BSAI pollock fishery is a gross oversimplification that significantly understates the economic consequences and does not include any consideration of economic multipliers. The DEIS fails to inform the Council, the agency and the public of the economic consequences that would flow from the proposed alternatives to close the fishery prematurely. The economic impact of an unanticipated interruption in pollock production does not accommodate the 'practicability test' imposed by National Standard 9.

Response: NMFS acknowledges that the use of potentially forgone first wholesale gross revenues is not an ideal reflection of the expected economic costs (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in Chinook bycatch management. An explanation of the reasons for adopting this analytical approach is summarized in response to comment 10-83 and is included here by reference.

In order to estimate "profits", one must have data on costs, not simply revenues. NMFS does not have data to estimate net impacts until such time the Council develops a socioeconomic data collection program that requires the industry to submit cost data under new MSA authority. These gross receipts may, of course, not be, in any meaningful way, indicative of realized net revenues, but by default serve as the best available "proxy" for economic earnings in these fisheries.

It must also be noted that "maximizing profit" is only *one*, among several possible motivating factors that may be "assumed" to define the objectives of a business enterprise.

Absent accurate, verifiable cost data and operational information for the pollock trawl fleets operating in the BSAI, gross revenue estimates constitute the "best" empirical economic information available. NMFS fully acknowledges that changes in first wholesale (or ex vessel, as appropriate) revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS' ability to empirically characterize the expected sectoral outcome in the pollock fishery, attributable to changes in Chinook bycatch management under consideration. And, further, this explains the very extensive reliance upon, and systematic treatment of, "qualitative" cost and benefit analysis, reflected in the RIR, as required under E.O.12866.

Comment 10-91: Any analysis of costs that examines only industry-wide or sector level consequences is certain to grossly underestimate aggregate costs incurred by individual operators. Chinook salmon bycatch is highly variable annually and varies among vessels. The DEIS has not analyzed the impact of protective measures on individual fishing companies or individual vessels.

Response: NMFS agrees with the comment and acknowledges that sector or industry-wide aggregation within an analysis will tend to "smooth" the variability of impacts that actually exist within the assessed population (i.e., highs offset lows). Unfortunately, the analysis of "... costs incurred by individual operators" and/or impacts "... on individual fishing companies or individual vessels", requested by the

commenter, [1] cannot be performed, given the composition and detail of the empirical data available to NMFS, and [2] could not be presented, even if the necessary data were available, owing to data confidentiality laws. For these reasons, qualitative and descriptive treatment of expected economic and socioeconomic impacts, their distribution, and intensity are a fundamental part of preparation and presentation of an RIR.

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Appendix 1 – Revised Section 3.3 Estimating Chinook salmon adult equivalent bycatch

3.3 Estimating Chinook salmon adult equivalent bycatch

To understand impacts on Chinook populations, a method was developed to estimate how the different bycatch numbers would propagate to adult equivalent spawning salmon. Estimating the adult equivalent bycatch is necessary because not all salmon caught as bycatch in the pollock fishery would otherwise have survived to return to their spawning streams. Currently, accurate in-season Chinook salmon abundance levels are unavailable. Therefore, this analysis relies on analyses of historical data. Developing regulations designed to reduce the impact of bycatch requires methods that appropriately assess the impact of bycatch on the various salmon populations. A stochastic "adult equivalence" model was developed, which accounts for sources of uncertainty. The model is an extension of Witherell et al.'s (2002) evaluation, and relaxes a number of that study's assumptions.

Adult-equivalency (AEQ) of the bycatch was estimated to translate how different hard caps may affect Chinook salmon stocks. This is distinguished from the annual bycatch numbers that are recorded by observers each year for management purposes. The AEQ bycatch applies the extensive observer datasets on the length frequencies of Chinook salmon found as bycatch and converts these to the ages of the bycaught salmon, appropriately accounting for the time of year that catch occurred. Coupled with information on the proportion of salmon that return to different river systems at various ages, the bycatch-at-age data is used to pro-rate, for any given year, how bycatch affects future potential spawning runs of salmon.

Evaluating impacts to specific stocks was done by using historical scale-pattern analysis (Myers et al.1984, Myers and Rogers 1988, Myers et al. 2003) and preliminary genetics studies from samples collected in 2005, 2006 and 2007 (Seeb et al. 2008). While sample collection issues exist (as described in section 3.3.2) and different methodologies were employed (scale pattern analyses and genetic analyses), these stock estimates nonetheless provide similar overall proportions of between 54-60% for western Alaska. The consistency of these results from these different methodologies lends credibility to this general estimate. Where possible, historical run sizes were contrasted with AEQ mortality arising from the observed pollock fishery Chinook bycatch to river of origin.

3.3.1 Estimating Chinook salmon catch-at-age

In order to appropriately account for the impact of salmon bycatch in the groundfish fisheries, it is desirable to correct for the age composition of the bycatch. For example, the impact on salmon populations of a bycatch level of 10,000 adult mature salmon is likely greater than the impact of catching 10,000 salmon that have just emerged from rivers and only a portion of which are expected to return for spawning in several years time. Hence, estimation of the age composition of the bycatch (and the measure of uncertainty) is critical. The method follows an expanded version of Kimura (1989) and modified by Dorn (1992). Length at age data are used to construct age-length keys for each stratum and sex. These keys are then applied to randomly sampled catch-at-length frequency data. The stratum-specific age composition estimates are then weighted by the catch within each stratum to arrive at an overall age composition for each year.

The modification from Kimura's (1989) approach was simply to apply a two-stage bootstrap scheme to obtain variance estimates. In the first stage, for a given year, sampled tows were drawn with replacement from all tows from which salmon were measured. In the second stage, given the collection of tows from

the first stage, individual fish measurements were resampled with replacement. All stratum-specific information was carried with each record. For the length-age data, a separate but similar two-stage bootstrap process was done. Once samples of lengths and ages were obtained, age-length keys were constructed and applied to the catch-weighted length frequencies to compute age composition estimates. This process was repeated 100 times, and the results stored to obtain a distribution of both length and age composition.

Three years of length-at-age data are available from Myers et al. (2003). These data are based on salmon scale samples collected by the NMFS groundfish observer program from 1997-1999 and processed for age determination (and river of origin) by scientists at the University of Washington (Table 3-1). The bycatch in the A-season is dominated by age 5 fish (51%) with ages 6 and 7 Chinook representing 15% on average while ages 3 and 4 are 35%.

Table 3-1 Summary of Chinook salmon bycatch age data from Myers et al (2003) used to construct age-length keys for this analysis.

Year	A	B	Total
1997	842	756	1,598
1998	873	826	1,699
1999	645	566	1,211
Total	2,360	2,148	4,508

Extensive salmon bycatch length frequency data are available from the NMFS groundfish observer program since 1991 (Table 3-2). The age data were used to construct age length keys for nine spatio-temporal strata (one area for winter, two areas for summer-fall, for each of three fishery sectors). Each stratum was weighted by the NMFS Alaska Region estimates of salmon bycatch (Table 3-3). To the extent possible, sex-specific age-length keys within each stratum were created and where cells were missing, a "global" sex-specific age-length key was used. The global key was simply computed over all strata within the same season. For years other than 1997-1999, a combined-year age-length key was used (based on all of the 1997-1999 data). This method was selected in favor of simple (but less objective) length frequency slicing based on evaluations of using the combined key on the individual years and comparing age-composition estimates with the estimates derived using annual age-length keys. The reason that the differences were minor is partially due to the fact that there are only a few age classes caught as bycatch, and these are fairly well determined by their length at-age distribution (Fig. 3-1).

The bootstrapped distributions of salmon length frequencies are shown in Fig. 3-2 and the resulting application of bootstrapped age-length keys is shown in Fig. 3-3 with mean values given in (Table 3-4). For modeling purposes, it's necessary to track the estimated numbers of salmon caught by age and season (Table 3-5). The estimates catch-age uncertainty (Table 3-6) were propagated through the analysis and includes covariance structure (e.g., as illustrated in Fig. 3-4).

Table 3-2 The number of Chinook salmon measured for lengths in the pollock fishery by season (A and B), area (NW=east of 170°W; SE=west of 170°W), and sector (S=shorebased catcher vessels, M=mothership operations, CP=catcher-processors). *Source: NMFS Alaska Fisheries Science Center observer data.*

Season	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	
Area	**All**	**All**	**All**	**NW**	**NW**	**NW**	**SE**	**SE**	**SE**	
Sector	**S**	**M**	**CP**	**S**	**M**	**CP**	**S**	**M**	**CP**	**Total**
1991	2,227	302	2,569		25	87	221	10	47	5,488
1992	2,305	733	889	2	4	14	1,314	21	673	5,955
1993	1,929	349	370	1	11	172	298	255	677	4,062
1994	4,756	408	986	3	93	276	781	203	275	7,781
1995	1,209	264	851		8	31	457	247	305	3,372
1996	9,447	976	2,798		17	161	5,658	1,721	493	21,271
1997	3,498	423	910	12	303	839	12,126	370	129	18,610
1998	3,124	451	1,329		38	191	8,277	2,446	1,277	17,133
1999	1,934	120	1,073		1	627	1,467	97	503	5,822
2000	608	17	1,388	4	40	179	564	3	120	2,923
2001	4,360	268	3,583		25	1,816	1,597	291	1,667	13,607
2002	5,587	850	3,011		23	114	5,353	520	494	15,952
2003	9,328	1,000	5,379	258	290	1,290	4,420	348	467	22,780
2004	7,247	594	3,514	1,352	557	1,153	8,884	137	606	24,044
2005	9,237	694	3,998	4,081	244	1,610	10,336	45	79	30,324
2006	17,875	1,574	5,716	685	66	480	12,757	3	82	39,238
2007	16,008	1,802	9,012	881	590	1,986	21,725	2	801	52,807

Table 3-3 Chinook salmon bycatch in the pollock fishery by season (A and B), area (NW=east of 170°W; SE=west of 170°W), and sector (S=shorebased catcher vessels, M=mothership operations, CP=catcher-processors). *Source: NMFS Alaska Region, Juneau.*

Season	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	
Area	**All**	**All**	**All**	**NW**	**NW**	**NW**	**SE**	**SE**	**SE**	
Sector	**S**	**M**	**CP**	**S**	**M**	**CP**	**S**	**M**	**CP**	**Total**
1991	10,192	9,001	17,645	0	48	318	1,667	103	79	39,054
1992	6,725	4,057	12,631	0	26	187	1,604	1,739	6,702	33,672
1993	3,017	3,529	8,869	29	157	7,158	2,585	6,500	4,775	36,619
1994	8,346	1,790	17,149	0	121	771	1,206	452	2,055	31,890
1995	2,040	971	5,971		35	77	781	632	2,896	13,403
1996	15,228	5,481	15,276		113	908	9,944	6,208	2,315	55,472
1997	4,954	1,561	3,832	43	2,143	4,172	22,508	3,559	1,549	44,320
1998	4,334	4,284	6,500		309	511	27,218	6,052	2,037	51,244
1999	3,103	554	2,694	13	12	1,284	2,649	362	1,306	11,978
2000	878	19	2,525	4	230	286	714	23	282	4,961
2001	8,555	1,664	8,264	0	162	5,346	3,779	1,157	4,517	33,444
2002	10,336	1,976	9,481	0	38	211	9,560	1,717	1,175	34,495
2003	16,488	2,892	14,428	764	864	2,962	6,437	1,076	1,081	46,993
2004	12,376	2,092	9,492	2,530	1,573	2,844	21,171	503	1,445	54,028
2005	14,097	2,111	11,421	8,873	744	4,175	26,113	144	168	67,847
2006	36,039	5,408	17,306	936	175	1,373	21,718	25	178	83,159
2007	35,458	5,860	27,943	1,672	3,494	4,923	40,079	50	2,225	121,704

Table 3-4 Calendar year age-specific Chinook salmon bycatch estimates based on the mean of 100 bootstrap samples of available length and age data. Age-length keys for 1997-1999 were based on Myers et al. (2003) data split by year while for all other years, a combined-year age-length key was used.

Year	Age 3	Age 4	Age 5	Age 6	Age 7	Total
1991	5,624	15,901	13,486	3,445	347	38,802
1992	5,136	9,528	14,538	3,972	421	33,596
1993	2,815	16,565	12,992	3,673	401	36,446
1994	849	5,300	20,533	4,744	392	31,817
1995	498	3,895	4,827	3,796	367	13,382
1996	5,091	18,590	26,202	5,062	421	55,366
1997	5,855	23,972	7,233	5,710	397	43,167
1998	19,168	16,169	11,751	2,514	615	50,216
1999	870	5,343	4,424	1,098	21	11,757
2000	662	1,923	1,800	518	34	4,939
2001	6,512	12,365	11,948	1,994	190	33,009
2002	3,843	13,893	10,655	5,469	489	34,349
2003	5,703	16,723	20,124	3,791	298	46,639
2004	6,935	23,740	18,371	4,406	405	53,858
2005	10,466	30,717	21,886	4,339	304	67,711
2006	11,835	31,455	32,452	6,636	490	82,869
2007	16,174	66,024	33,286	5,579	357	121,419

Table 3-5 Age specific Chinook salmon bycatch estimates by season and calendar age based on the mean of 100 bootstrap samples of available length and age data.

Year/season	Age 3	Age 4	Age 5	Age 6	Age 7	Total
1991	**5,624**	**15,901**	**13,486**	**3,445**	**347**	**38,802**
A	5,406	14,764	12,841	3,270	313	36,593
B	218	1,137	646	174	34	2,209
1992	**5,136**	**9,528**	**14,538**	**3,972**	**421**	**33,596**
A	1,017	4,633	13,498	3,798	408	23,355
B	4,119	4,895	1,040	174	13	10,241
1993	**2,815**	**16,565**	**12,992**	**3,673**	**401**	**36,446**
A	1,248	3,654	7,397	2,778	290	15,368
B	1,567	12,910	5,595	895	111	21,078
1994	**849**	**5,300**	**20,533**	**4,744**	**392**	**31,817**
A	436	3,519	18,726	4,211	326	27,218
B	413	1,781	1,807	533	66	4,599
1995	**498**	**3,895**	**4,827**	**3,796**	**367**	**13,382**
A	262	1,009	3,838	3,534	327	8,969
B	236	2,885	989	263	40	4,413
1996	**5,091**	**18,590**	**26,202**	**5,062**	**421**	**55,366**
A	863	7,187	23,118	4,431	349	35,947
B	4,228	11,403	3,085	632	71	19,418
1997	**5,855**	**23,972**	**7,233**	**5,710**	**397**	**43,167**
A	456	2,013	3,595	3,899	271	10,234
B	5,399	21,958	3,638	1,811	126	32,933
1998	**19,168**	**16,169**	**11,751**	**2,514**	**615**	**50,216**
A	1,466	2,254	8,639	2,079	512	14,950
B	17,703	13,915	3,112	435	103	35,266
1999	**870**	**5,343**	**4,424**	**1,098**	**21**	**11,757**
A	511	1,639	3,151	898	18	6,217
B	360	3,704	1,272	200	3	5,540
2000	**662**	**1,923**	**1,800**	**518**	**34**	**4,939**
A	365	1,167	1,406	453	26	3,416
B	298	757	395	66	8	1,522
2001	**6,512**	**12,365**	**11,948**	**1,994**	**190**	**33,009**
A	2,840	3,458	9,831	1,798	171	18,098
B	3,672	8,907	2,117	196	19	14,910
2002	**3,843**	**13,893**	**10,655**	**5,469**	**489**	**34,349**
A	1,580	5,063	9,234	5,328	478	21,683
B	2,263	8,830	1,421	141	11	12,666
2003	**5,703**	**16,723**	**20,124**	**3,791**	**298**	**46,639**
A	2,941	9,408	17,411	3,437	267	33,464
B	2,763	7,315	2,713	354	31	13,175
2004	**6,935**	**23,740**	**18,371**	**4,406**	**405**	**53,858**
A	1,111	5,520	13,090	3,763	354	23,838
B	5,824	18,220	5,282	643	51	30,020
2005	**10,466**	**30,717**	**21,886**	**4,339**	**304**	**67,711**
A	1,407	6,993	15,563	3,361	226	27,550
B	9,059	23,724	6,323	978	78	40,161
2006	**11,835**	**31,455**	**32,452**	**6,636**	**490**	**82,869**
A	3,604	17,574	30,447	6,404	465	58,494
B	8,231	13,881	2,005	232	25	24,374
2007	**16,174**	**66,024**	**33,286**	**5,579**	**357**	**121,419**
A	5,791	29,269	28,648	5,059	317	69,084
B	10,384	36,755	4,638	520	40	52,336

Table 3-6 Estimates of coefficients of variation of Chinook salmon bycatch estimates by season and calendar age based on the mean of 100 bootstrap samples of available length and age data.

A season	Age 3	Age 4	Age 5	Age 6	Age 7
1991	14%	6%	6%	10%	31%
1992	20%	9%	4%	9%	27%
1993	22%	9%	5%	10%	37%
1994	27%	12%	3%	10%	30%
1995	25%	12%	5%	6%	22%
1996	19%	6%	2%	9%	21%
1997	35%	12%	6%	7%	28%
1998	16%	9%	3%	10%	23%
1999	19%	10%	5%	11%	91%
2000	25%	9%	6%	9%	27%
2001	10%	6%	3%	7%	22%
2002	15%	6%	3%	4%	16%
2003	14%	6%	3%	8%	21%
2004	15%	6%	2%	5%	20%
2005	18%	6%	3%	7%	23%
2006	17%	5%	3%	7%	22%
2007	22%	5%	4%	8%	25%
B season	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**
1991	23%	8%	12%	27%	67%
1992	9%	9%	25%	69%	87%
1993	19%	4%	9%	20%	65%
1994	17%	6%	6%	14%	27%
1995	21%	5%	12%	23%	48%
1996	6%	3%	7%	11%	29%
1997	12%	3%	10%	12%	39%
1998	5%	6%	9%	23%	36%
1999	16%	3%	8%	22%	149%
2000	9%	5%	8%	25%	49%
2001	7%	3%	8%	20%	52%
2002	6%	2%	8%	17%	43%
2003	8%	3%	5%	15%	32%
2004	6%	2%	5%	12%	30%
2005	5%	2%	5%	10%	23%
2006	4%	3%	8%	15%	33%
2007	6%	2%	7%	13%	28%

3.3.2 Estimating genetic composition of Chinook salmon bycatch

This section provides an overview the best available information used to determine the region or river of origin of the Chinook salmon caught as bycatch in the Bering Sea pollock fishery. The AEQ model uses genetic estimates of Chinook salmon taken as bycatch in the Bering Sea pollock fishery to determine where the AEQ Chinook salmon would have returned. To determine the stock composition mixtures of Chinook salmon in the Bering Sea, the model uses best available genetics analysis from ADF&G scientists (Templin et al. 2008). Genetic stock identification estimated the relative composition of 15 regional groups in the bycatch samples. For this analysis, estimates are provided for the 8 largest contributing groups and the remaining components were combined into the 'other' category, resulting in 9 stock groups (Table 3-7).

A scale pattern analysis completed in 2003 estimated age and stock composition of Chinook salmon in the 1997-1999 BSAI groundfish fishery bycatch samples from the NMFS Groundfish Observer Program database (Myers et al. 2003). Results indicated that bycatch samples were dominated by younger (age 1.2) fish in summer and older (age 1.3 and 1.4) fish in winter (Myers et al. 2003). The stock structure was dominated by western Alaskan stocks, with the estimated overall stock composition of 56% western Alaska, 31% Cook Inlet, 8% Southeast Alaska-British Columbia and 5% Russia. Here "western Alaska" included the Yukon River, Kuskokwim River, and Bristol Bay (Nushagak and Togiak) rivers. Within this aggregate grouping, the proportion of the sub-regional stock composition estimates averaged 40% Yukon River, 34% Bristol Bay and 26% Kuskokwim Chinook salmon Table 3-8Myers et al. 2003).

For comparison against previous estimates, results from Myers and Rogers (1988) scale pattern analysis of bycatch samples from 1979-1982 (collected by U.S. foreign fishery observes on foreign or joint venture vessels in the Bering Sea EEZ) indicated that stock structure was dominated by western Alaskan stocks with estimated overall stock composition of 60% western Alaska, 17% South Central, 13% Asia (Russia) and 9% Southeast Alaska-British Columbia. Within the aggregated western Alaskan group, 17% were of Yukon River salmon, with 29% Bristol Bay and 24% Kuskokwim salmon.

As indicated in Myers et al. (2003), the origin of salmon also differs by season. In the winter, age-1.4 western Alaskan Chinook were primarily from the subregions of the Yukon and Kuskokwim. In the fall, results indicated that age-1.2 western Alaskan Chinook were from subregions of the Kuskokwim and Bristol Bay with a large component of Cook Inlet Chinook salmon stocks as well.

The proportions of western Alaskan subregional stocks (Yukon, Kuskokwim and Bristol Bay) appear to vary considerably with factors such as brood year, time and area (Myers et al. 2003). Yukon River Chinook are often the dominant stock in winter while Bristol Bay, Cook Inlet and other Gulf of Alaska stocks are often the dominant stocks in the eastern BSAI in the fall (Myers et al. 2003). Additional studies from high seas tagging results as well as scale pattern analyses from Japanese driftnet fishery in the Bering Sea indicate that in the summer immature western Alaskan Chinook are distributed further west in the Bering Sea than other North American stocks. For the scale-pattern analyses, freshwater-type (age 0.1, 0.2, etc) Chinook were omitted. Although the proportion of these samples were relatively small, the extent that Chinook bycatch could be attributed to southern stocks where this type is more common (e.g., from the Columbia River) may be underestimated in the Myers et al. (2003) analysis.

More recent analyses of bycatch samples are underway (Templin et al. 2008). For purposes of evaluation of impacts of alternatives on individual river systems, the most recent estimates (Seeb et al. 2008) are the main reference for evaluating the impact of bycatch on the 9 sets of river systems. These more recent estimates were chosen since they are most representative of the timeframe analyzed. Earlier work presented in Myers et al. (2003) had a different resolution to stock composition and was from samples covering an earlier period.

To illustrate the influence of bycatch temporal and spatial variability regarding bycatch stock composition, retrospective analyses were performed using the available genetics data collected from 2005-2007. We acknowledge that this assumption (i.e., constant stock composition within season-area strata) may be poor, especially for years beyond this period. For the main impact analysis the time period was selected to be from 2003-2007 which overlaps with the sample collection period and may reduce concerns about mis-matches between the sampling period for genetics work and the application period for impact analysis.

Scientists at ADF&G developed a DNA baseline to resolve the stock composition mixtures of Chinook salmon in the Bering Sea (Templin et al. 2008). This baseline includes 24,100 individuals sampled from

over 175 rivers from the Kamchatka Peninsula, Russia, to the central Valley in California (see Table 3-7 for list of rivers).

The Templin et al. (2008) genetic stock identification (GSI) study used classification criteria whereby the accuracy of resolution to region-of-origin must be greater than or equal to 90%. This analysis identified 15 regional groups for reporting results and for purposes of this analysis these were combined into nine stock units. The nine stock units are: Pacific Northwest (PNW, comprised of baseline stocks across BC, OR, WA and CA); Coastal western Alaska (Coast WAK comprised of the lower Yukon, the Kuskokwim River and Bristol Bay (Nushagak) river systems); Cook Inlet; Middle Yukon; Northern Alaska Peninsula (NAK Penin); Russia; Southeast and Transboundary River Systems (TBR); and Upper Yukon, while minor components in the bycatch are combined into the "other" category for clarity. Consistent with previous observations regarding the seasonal and regional differences in stock origin of bycatch samples (Myers et al. 2003), bycatch samples were stratified by year, season and region (Table 3-9).

The Seeb et al. (2008) study analyzed samples taken from the bycatch during the 2005 B season, both A and B seasons during 2006, and a sample from an excluder test fishery during the 2007 A season. Where possible, the genetics samples from the bycatch were segregated by major groundfish bycatch regions. Effectively, this entailed a single region for the entire fishery during winter (which is typically concentrated in space to the region east of 170°W) and two regions during the summer, a NW region (west of 170°W) and a southeast region (east of 170°W). The genetic sampling distribution varies considerably by season and region compared to the level of bycatch (as reported by the NMFS Alaska Region, Table 3-3).

The samples used in the Seeb et al. (2008) analysis were obtained opportunistically for a study to evaluate using scales and other tissues as collected by the NMFS observer program for genetic sampling. Unfortunately, during this study, the collected samples failed to cover the bycatch in groundfish fisheries in a comprehensive manner. For example, in 2005 most sampling was completed prior to the month (October) when most of the bycatch occurred (Fig. 3-5). To account for these sampling issues we computed a weighted average of the samples over years within regions and seasons. The 2005 B-season stock composition results were given one third of the weight since sampling effort was low during October of that year (relative to the bycatch) while the 2006 B-season stock composition data was given two-thirds of the weight in simulating stock apportionments. For the A season, the 2007 data (collected from a limited number of tows) were given one fifth the weight while the 2006 was weighted 4 times that value.

Once these mean stock composition estimates (and associated uncertainties) were obtained, it was necessary to apply the stratum-specific stock composition levels (Table 3-11) to the stratum specific bycatch totals to arrive at an annual stock-specific bycatch level for application in the model (Fig. 3-6). An important feature of this analysis is that the bycatch amounts by location and season were used explicitly for the estimates of the relative contribution of bycatch from different salmon regions (e.g. Fig. 3-8). This is also an important distinction from previous studies (e.g. Myers et al, 2003) which assumed that the stock identification samples were proportional to the season and area specific bycatch over all years.

For the purposes of assigning the bycatch to region of origin, the level of uncertainty is important to characterize. While there are many approaches to implement assignment uncertainty, the method chosen here assumes that the stratified stock composition estimates are unbiased and that the assignment uncertainty based on a classification algorithm (Seeb et al. 2008; Table 3-9) adequately represents the uncertainty (i.e., the estimates and their standard errors are used to propagate this component of uncertainty). Inter-annual variability is introduced two ways: (1) by accounting for inter-annual variability in bycatch among strata; and (2) by using the point estimates (and errors) from the data (Table

3-11) over the different years (2005-2007) while weighting appropriately for the sampling intensity. The procedure for introducing variability in regional stock assignments of bycatch followed a Monte Carlo procedure with the point estimates and their variances used to simulate beta distributed random variables (which have the desirable property of being bounded by 0.0 and 1.0) and applied to the catch weightings (for the summer/fall (B) season) where areas are disaggregated. Areas were combined for the winter fishery since the period of bycatch by the fishery is shorter and from a more restricted area.

Application of GSI to estimate the composition of the bycatch by reporting region suggests that, if the goal is to provide estimates on the stock composition of the bycatch, there is a need to adjust for the magnitude of bycatch occurring within substrata (e.g., east and west of 170°W during the B season, top panels of Fig. 3-6). Applying the stock composition results presented in Table 3-11 over different years and weighted by catch gives stratified proportions that have similar characteristics to the raw genetics data (Table 3-9). Importantly, these stratified stock composition estimates can be applied to bycatch levels in other years which will result in overall annual differences in bycatch proportions by salmon stock region. These simulations can be characterized graphically in a way that shows the covariance structure among regional stock composition estimates. This application extrapolates beyond the current analysis of these genetic data however and additional investigation of the temporal variation in stock composition is recommended.

The preliminary stock composition estimates for this more recent study based on the genetics are shown broken out by regions, year and season for the 9 stock units identified (Table 3-9). Accounting for sampling variability, the mean stock compositions by strata, and mean apportionments of the bycatch to stock (region) of origins by area and season of the pollock fishery are shown in Table 3-11.

While stock units differ from previous studies in levels of aggregation, results for western Alaskan aggregate river systems (e.g., AYK region) are similar to the scale-pattern study presented by Myers and Rogers (1988) and Myers et al. (2003; Table 3-12). The three studies indicate similarities in overall estimates of stock composition by river system even though aggregation levels, years of samples, and methodologies differ (Table 3-12). However, comparisons of stock composition estimates from other areas are more variable. For example the contribution from Cook Inlet stocks ranges from 4%-31% amongst studies while Russian stocks vary from 2%-14% (Table 3-12). There is particular variation amongst the two scale patterns studies (Myers and Rogers 1988 and Myers et al. 2003) for these other stocks. Due to this apparent variability the impact analysis focused mainly on the AYK stocks, in particular the Yukon, Kuskokwim and Bristol Bay river systems. Impacts are characterized in aggregate for these stocks, in aggregate for Coastal western Alaska grouping (which includes the lower Yukon, Kuskokwim and other minor stocks) as well as by individual river system. Impacts are reported in general for stocks such as Cook Inlet, aggregate Pacific Northwest, and Russia but discussions of these are limited due to the uncertainty.

For this impact analysis, it was desirable to provide some estimates of AEQ specific to the following western Alaska river systems individually: Yukon, Kuskokwim, Bristol Bay. The recent genetics study treated these stocks as a group. Thus, for purposes of discussion in this analysis, the AEQ results for the Coastal western Alaska stock grouping were combined with results for the middle and upper Yukon and the resulting aggregate broken out to individual river systems using the proportions estimated by Myers et al. (2003). Doing so provides a way to make rough comparisons of bycatch impacts (AEQ) and river system specific measures of run size, harvest, and escapement. However, impacts presented in this analysis are characterized to the extent possible within the limitations of the data. AEQ estimation was employed to provide some information on the relative impacts by genetic groupings and in conjunction with scale pattern estimates by western Alaskan river systems. As noted previously, these data are limited by their uncertainty thus extensions of these results beyond the scope of the data was carefully avoided.

Use of total run-size estimates for impact analysis by river system or in aggregate is problematic. As described in sections 5.2 assessment of total run size and escapement by river system is highly variable between systems. Some river systems in the WAK region lack total run or escapement estimates. As such, combining available estimates to determine an "aggregate total run" for WAK is inappropriate due to magnification of errors as well as masking the uncertainties and data limitations associated with individual river system estimates. Use of individual run estimates to compare with bycatch AEQ is also complicated by the caveats associated with the stock composition estimates. AEQ estimation to river of origin is used to estimate the relative changes under various cap scenarios. These estimates are also uncertain and that uncertainty increases with further extrapolations historically and to finer resolutions. Therefore, judgements with respect to detailed impacts were avoided, especially in cases where it would require interpretations beyond the extent of the data. Finally, impact rates by river system (i.e., explicit comparison of AEQ with run size for runs) would presume analyses on productivity thresholds about river systems that are beyond the scope of this analysis.

Additional funding and research focus is being directed towards both collection of samples from the EBS trawl fishery for Chinook salmon species as well as the related genetic analyses to estimate stock composition of the bycatch. Additional information on the status of these data collections and analysis programs will be forthcoming.

Table 3-7 Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. 2008).

No.	Region	Location	Years	N
1	Russia	Bistraya River	1998	94
2		Bolshaya River	1998, 2002	77
3		Kamchatka River (Late)	1997, 1998	119
4		Pakhatcha River	2002	50
5	Coast W AK (Norton Sound)	Pilgrim River	2005, 2006	82
6		Unalakleet River	2005	82
7		Golsovia River	2005, 2006	111
8	Coast W AK (Lower Yukon)	Andreafsky River	2002, 2003	236
9		Anvik River	2002	95
10		Gisasa River	2001	188
11		Tozitna River	2002, 2003	290
12	Middle Yukon	Henshaw Creek	2001	147
13		S. Fork Koyuk	2003	56
14		Kantishna River	2005	187
15		Chena River	2001	193
16		Salcha River	2005	188
17		Beaver Creek	1997	100
18		Chandalar River	2002, 2003, 2004	175
19		Sheenjek River	2002, 2004, 2006	51
20	Upper Yukon	Chandindu River	2000, 2001, 2003	247
21		Klondike River	1995, 2001, 2003	79
22		Stewart River	1997	99
23		Mayo River	1992, 1997, 2003	197
24		Blind River	2003	134
25		Pelly River	1996, 1997	140
26		Little Salmon River	1987, 1997	100
27		Big Salmon River	1987, 1997	117
28		Tatchun Creek	1987, 1996, 1997, 2002, 2003	369
29		Nordenskiold River	2003	55
30		Nisutlin River	19,871,997	56
31		Takhini River	1997, 2002, 2003	162
32		Whitehorse Hatchery	1985, 1987, 1997	242
33	Coast W AK (Kuskokwim)	Goodnews River	1993, 2005, 2006	368
34		Arolik River	2005	147
35		Kanektok River	1992, 1993, 2005	244
36		Eek River	2002, 2005	173
37		Kwethluk River	2001	96
38		Kisaralik River	2001, 2005	191
39		Tuluksak River	1993, 1994, 2005	195
40		Aniak River	2002, 2005, 2006	336
41		George River	2002, 2005	191
42		Kogrukluk River	1992, 1993, 2005	149
43		Stony River	1994	93
44		Cheeneetnuk River	2002, 2006	117
45		Gagaryah River	2006	190
46		Takotna River	1994, 2005	176
47	Upper Kuskokwim	Tatlawiksuk River	2002, 2005	191
48		Salmon River (Pitka Fork)	1995	96
49	Coast W AK (Bristol Bay)	Togiak River	1993, 1994	159
50		Nushagak River	1992, 1993	57
51		Mulchatna River	1994	97
52		Stuyahok River	1993, 1994	87
53		Naknek River	1995, 2004	110
54		Big Creek	2004	66
55		King Salmon River	2006	131
56	N. AK Peninsula	Meshik River	2006	42
57		Milky River	2006	67
58		Nelson River	2006	95
59		Black Hills Creek	2006	51
60		Steelhead Creek	2006	93
61	S. AK Peninsula	Chignik River	1995, 2006	75
62		Ayakulik River	1993, 2006	136
63		Karluk River	1993, 2006	140

Table 3-7 (continued) Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. 2008).

No.	Region	Location	Years	N
64	Cook Inlet	Deshka River	1995, 2005	251
65		Deception Creek	1991	67
66		Willow Creek	2005	73
67		Prairie Creek	1995	52
68		Talachulitna River	1995	58
69		Crescent Creek	2006	164
70		Juneau Creek	2005, 2006	119
71		Killey Creek	2005, 2006	266
72		Benjamin Creek	2005, 2006	205
73		Funny River	2005, 2006	220
74		Slikok Creek	2005	95
75		Kenai River (mainstem)	2003, 2004, 2006	302
76		Crooked Creek	1992, 2005	306
77		Kasilof River	2005	321
78		Anchor River	2006	200
79		Ninilchik River	2006	162
80	Upper Copper River	Indian River	2004, 2005	50
81		Bone Creek	2004, 2005	78
82		E. Fork Chistochina River	2004	145
83		Otter Creek	2005	128
84		Sinona Creek	2004, 2005	157
85	Lower Copper River	Gulkana River	2004	211
86		Mendeltna Creek	2004	144
87		Kiana Creek	2004	75
88		Manker Creek	2004, 2005	62
89		Tonsina River	2004, 2005	75
90		Tebay River	2004, 2005, 2006	68
91	Northern SE AK	Situk River	1988, 1990, 1991, 1992	143
92		Big Boulder Creek	1992, 1993, 1995, 2004	178
93		Tahini River	1992, 2004	169
94		Tahini River (LMH) Pullen Creek Hatchery	2005	83
95		Kelsall River	2004	96
96		King Salmon River	1989, 1990, 1993	144
97	Coast SE AK	King Creek	2003	143
98		Chickamin River	1990, 2003	56
99		Chickamin River - Little Port Walter	1993, 2005	126
100		Chickamin River - Whitman Lake Hatchery	1992, 1998, 2005	331
101		Humpy Creek	2003	94
102		Butler Creek	2004	95
103		Clear Creek	1989, 2003, 2004	166
104		Cripple Creek	1988, 2003	143
105		Genes Creek	1989, 2003, 2004	95
106		Kerr Creek	2003, 2004	151
107		Unuk River - Little Port Walter	2005	150
108		Unuk River - Deer Mountain Hatchery	1992, 1994	147
109		Keta River	1989, 2003	144
110		Blossom River	2004	95
111	Andrew Cr	Andrews Creek	1989, 2004	152
112		Crystal Lake Hatchery	1992, 1994, 2005	397
113		Medvejie Hatchery	1998, 2005	273
114		Hidden Falls Hatchery	1994, 1998	155
115		Macaulay Hatchery	2005	94
116	TBR Taku	Klukshu River	1989, 1990	174
117		Kowatua River	1989, 1990	144
118		Little Tatsemeanie River	1989, 1990, 2005	144
119		Upper Nahlin River	1989, 1990	130
120		Nakina River	1989, 1990	141
121		Dudidontu River	2005	86
122		Tahltan River	1989	95

Table 3-7 (continued) Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. 2008).

No.	Region	Location	Years	N
123	BC/WA/OR	Kateen River	2005	96
124		Damdochax Creek	1996	65
125		Kincolith Creek	1996	115
126		Kwinageese Creek	1996	73
127		Oweegee Creek	1996	81
128		Babine Creek	1996	167
129		Bulkley River	1999	91
130		Sustut	2001	130
131		Ecstall River	2001, 2002	86
132		Lower Kalum	2001	142
133		Lower Atnarko	1996	144
134		Kitimat	1997	141
135		Wannock	1996	144
136		Klinaklini	1997	83
137		Nanaimo	2002	95
138		Porteau Cove	2003	154
139		Conuma River	1997, 1998	110
140		Marble Creek	1996, 1999, 2000	144
141		Nitinat River	1996	104
142		Robertson Creek	1996, 2003	106
143		Sarita	1997, 2001	160
144		Big Qualicum River	1996	144
145		Quinsam River	1996	127
146		Morkill River	2001	154
147		Salmon River	1997	94
148		Swift	1996	163
149		Torpy River	2001	105
150		Chilko	1995, 1996, 1999, 2002	246
151		Nechako River	1996	121
152		Quesnel River	1996	144
153		Stuart	1997	161
154		Clearwater River	1997	153
155		Louis Creek	2001	179
156		Lower Adams	1996	46
157		Lower Thompson River	2001	100
158		Middle Shuswap	1986, 1997	144
159		Birkenhead Creek	1997, 1999, 2002, 2003	93
160		Harrison	2002	96
161		Makah National Fish Hatchery	2001, 2003	94
162		Forks	2005	150
163		Upper Skagit River	2006	93
164		Soos Creek Hatchery	2004	119
165		Lyons Ferry Hatchery	2002, 2003	191
166		Hanford Reach	2000, 2004, 2006	191
167		Lower Deschutes River	2002	96
168		Lower Kalama	2001	95
169		Carson Stock - Mid and Upper Columbia spring	2001	96
170		McKenzie - Willamette River	2004	95
171		Alsea	2004	93
172		Siuslaw	2001	95
173		Klamath	1990, 2006	52
174		Butte Creek	2003	96
175		Eel River	2000, 2001	88
176		Sacramento River - winter run	2005	95

Table 3-8 Maximum likelihood estimates (MLE) of the western Alaska subregional (Yukon, Kuskokwim, and Bristol Bay) stock composition of Chinook salmon in incidental catches by U.S. commercial groundfish fisheries in the eastern Bering Sea portion of the U.S. exclusive economic zone in 1997-1999 (from Myers et al. 2003). The estimates are summarized by (a) brood year (BY) 1991-1995 and (b) for the fishery area east of 170°W by fishery season, year, and age group. Fishery season: fall = July-December, winter = January-June. Numbers in parentheses are 95% confidence intervals (CI) derived from 1000 bootstrap runs (random sampling with replacement). An estimate of zero without a confidence interval indicates that the stock was not present and the data were re-analyzed without those baseline groups. Percentages represented by 0.0 are small numbers, less than 0.05 but greater than zero. Dashes indicate that no baseline data were available for that regional stock group.

Sample			Kamchatka		Yukon		Kuskokwim		Bristol Bay		Cook Inlet		SE Alaska		British Columbia	
Description	**Age(s)**	**N**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**	**MLE**	**(95% CI)**
(a) Summary by brood year:																
BY91	1.4-1.5	373	4.1	(0.0-10.0)	37.2	(17.2-56.1)	27.0	(4.4-47.4)	4.2	(0.0-12.1)	27.5	(18.3-37.5)	-	-	0	
BY92	1.3-1.5	530	6.0	(2.5-9.6)	29.7	(16.6-39.9)	5.5	(0.0-22.1)	21.0	(12.4-29.2)	33.4	(24.6-41.3)	-	-	4.4	(1.5-8.2)
BY93	1.2-1.4	1111	5.9	(3.0-9.5)	12.7	(4.0-23.2)	24.5	(11.4-37.3)	17.9	(11.1-25.3)	28.5	(21.8-34.1)	8.5	(5.7-11.2)	2.0	(0.0-4.1)
BY94	1.1-1.3	762	0		20.2	(12.3-30.4)	0		41.7	(33.9-49.7)	30.0	(20.5-37.5)	8.1	(5.1-11.8)	-	-
BY95	1.1-1.2	481	4.4	(0.1-10.2)	12.2	(4.2-20.7)	15.8	(6.7-24.1)	10.6	(0.0-28.1)	41.9	(28.4-52.4)	15.1	(9.2-22.0)	-	-
(b) Summary for the fishery area east of 170°W by fishery season, year, and age group:																
Fall 1998	1.1	134	0		6.1	(0-15.0)	3.9	(0-9.4)	0		57.7	(37.1-74.8)	32.3	(16.5-47.9)	-	-
Fall 1997	1.2	286	3.8	(0.0-8.7)	0.0	(0-13)	16.1	(1.7-25.4)	17.6	(9.5-28.5)	49.2	(37.1-58.5)	8.5	(3.7-14.5)	4.8	(0.2-10.5)
Fall 1998	1.2	249	0		10.2	(2.5-21.4)	0		41.4	(29.8-51.6)	38.7	(25.5-50.2)	9.7	(4.7-16.2)	-	-
Fall 1999	1.2	222	5.8	(0.0-12.9)	13.0	(2.0-25.3)	18.3	(5.6-33.3)	27.2	(4.5-50.2)	31.3	(16.3-44.7)	4.4	(0.0-9.8)	-	-
Winter 1997	1.3	240	5.7	(1.5-10.4)	24.6	(10.2-38.3)	5.9	(0.0-27.6)	28.0	(14.5-39.5)	30.0	(18.2-40.8)	-	-	5.8	(1.3-11.3)
Winter 1998	1.3	428	4.6	(0.8-9.7)	23.1	(11.2-36.9)	22.8	(6.7-38.8)	17.3	(8.8-27.3)	18.2	(9.9-26.4)	11.9	(7.5-16.3)	2.1	(0-6.3)
Winter 1999	1.3	279	0		34.7	(23.0-47.4)	0		37.6	(27.4-47.8)	18.5	(8.9-28.3)	9.2	(5.3-13.5)	-	-
Winter 1997	1.4	327	3.9	(0.0-9.7)	34.6	(14.8-53.7)	28.4	(6.8-48.9)	4.7	(0.0-13.4)	28.4	20.3-34.6)	-	-	0	
Winter 1998	1.4	178	10.9	(3.8-18.6)	35.0	(17.4-49.9)	12.8	(0.0-34.9)	10.1	(0.0-21.0)	31.2	(19.3-41.9)	-	-	0	
Winter 1999	1.4	122	22.0	(9.1-36.4)	9.9	(0.0-31.2)	32.2	(8.6-50)	2.9	(0-13.5)	28.2	(11.2-44.4)	4.8	(0-10.4)	0	

Table 3-9 ADF&G preliminary estimates of stock composition based on genetic samples stratified by year, season, and region (SE=east of 170°W, NW=west of 170°W). Standard errors of the estimates are shown in parentheses and were used to evaluate uncertainty of stock composition. Source: Seeb et al. 2008.

Year / Season / Area	PNW	Coast W AK	Cook Inlet	Middle Yukon	N AK Penin	Russia	TBR	Upper Yukon	Other
2005 B SE	45.3%	34.2%	5.3%	0.2%	8.8%	0.6%	3.3%	0.0%	2.4%
N = 313	(0.032)	(0.032)	(0.019)	(0.003)	(0.021)	(0.005)	(0.016)	(0.001)	(0.015)
2005 B NW	6.5%	70.9%	2.2%	4.7%	6.7%	2.0%	3.5%	2.8%	0.7%
N = 543	(0.012)	(0.047)	(0.011)	(0.013)	(0.042)	(0.007)	(0.012)	(0.009)	(0.008)
2006 B SE	38.4%	37.2%	7.5%	0.2%	7.0%	0.6%	4.3%	0.1%	4.7%
N = 309	(0.029)	(0.032)	(0.020)	(0.004)	(0.019)	(0.005)	(0.017)	(0.002)	(0.020)
2006 B NW	6.4%	67.3%	3.0%	8.0%	2.1%	3.3%	0.5%	8.0%	1.4%
N = 296	(0.016)	(0.035)	(0.020)	(0.020)	(0.016)	(0.013)	(0.007)	(0.019)	(0.014)
2006 A All	22.9%	38.2%	0.2%	1.1%	31.2%	1.1%	1.1%	2.3%	1.9%
N = 902	(0.015)	(0.038)	(0.004)	(0.005)	(0.039)	(0.004)	(0.007)	(0.006)	(0.011)
2007 A All	9.4%	75.2%	0.1%	0.5%	12.0%	0.2%	0.1%	0.1%	2.4%
N = 380	(0.016)	(0.031)	(0.004)	(0.005)	(0.025)	(0.003)	(0.002)	(0.003)	(0.014)

Table 3-10 NMFS regional office estimates of Chinook salmon bycatch in the pollock fishery compared to genetics sampling levels by season and region, 2005-2007 (SE=east of 170°W, NW=west of 170°W).

			Area			Area	
		Season	SE	NW	Total	SE	NW
Bycatch	2005	B	26,425	13,793	40,217	66%	34%
	2006	B	21,922	2,484	24,405	90%	10%
	2006	A			58,753		
	2007	A			69,261		
Genetic Samples	2005	B	489	282	771	63%	37%
	2006	B	286	304	590	48%	52%
	2006	A			801		
	2007	A			360		

Table 3-11 Mean values of catch-weighted stratified proportions of stock composition based on genetic sampling by season, and region (SE=east of 170°W, NW=west of 170°W). Standard errors of the estimates (in parentheses) were derived from 200 simulations based on the estimates from Table 3-9 and weighting annual results as explained in the text.

Season / Area	PNW	Coast W AK	Cook Inlet	Middle Yukon	N AK Penin	Russia	TBR	Upper Yukon	Other
B SE	45.0%	34.7%	5.1%	0.1%	8.6%	0.6%	3.4%	0.0%	2.4%
	(0.025)	(0.024)	(0.017)	(0.002)	(0.016)	(0.004)	(0.014)	(0.001)	(0.014)
B NW	6.4%	68.9%	2.6%	6.6%	4.4%	2.7%	1.8%	5.6%	1.0%
	(0.010)	(0.023)	(0.012)	(0.011)	(0.019)	(0.007)	(0.006)	(0.012)	(0.008)
A All	12.1%	67.7%	0.1%	0.6%	16.0%	0.4%	0.2%	0.6%	2.3%
	(0.012)	(0.021)	(0.003)	(0.004)	(0.019)	(0.002)	(0.002)	(0.003)	(0.010)

Table 3-12 Comparison of stock composition estimates for three different studies on Chinook bycatch samples taken from trawl fisheries in the eastern Bering Sea.

Study	Myers and Rogers (1988)				Myers et al (2003)			Seeb et al. 2008		
Years sampled	1979-1982				1997-1999			2005-2007[1]		
Stocks and estimated aggregate % composition in bycatch Smaller scale breakouts (where available) listed to the right (with associated % contrib. of aggregate below)	Western AK	60%			56%					
		Yukon	Bristol Bay	Kusko-kwim	Yukon	Bristol Bay	Kusko-kwim			
		17%	29%	24%	40%	34%	26%			
	Coastal WAK (also includes Norton Sound)							48%		
								Lower Yukon	Kusko-kwim	Bristol Bay
								Na	Na	Na
	Middle Yukon							3%		
	Upper Yukon							3%		
	NAK Penin							13%		
	Cook Inlet	17%			31%			4%		
	SEAK/Can	9%			8%					
	TBR							2%		
	PNW[2]							23%		
	Russia	14%			5%			2%		
	Other[3]							3%		

[1]note for purposes of comparison, only 2006 stock composition estimates *averaged annually and across regions* are shown here.

[2]PNW is an aggregate of over 150 stocks from British Columbia, Washington, Oregon and California. For a full list of stocks included see Table 3-7

[3]'other' is comprised of minor components after aggregation to major river systems as described in Table 3-7.

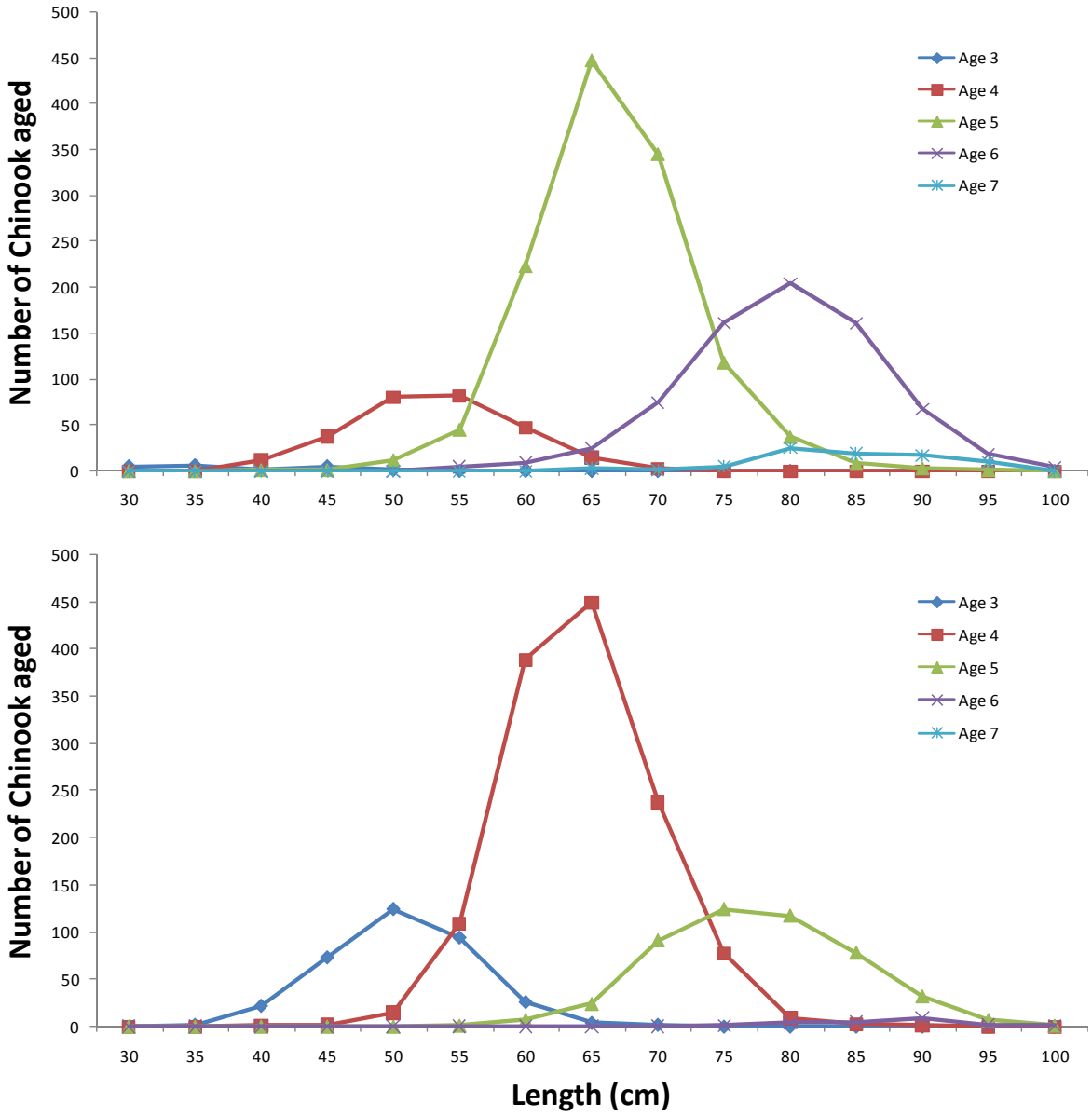

Fig. 3-1 Summary distribution of age samples by length collected by the NMFS groundfish observer program during 1997-1999 and analyzed by University of Washington scientists (Myers et al. (2003) for the A-season (top panel) and B season (bottom panel).

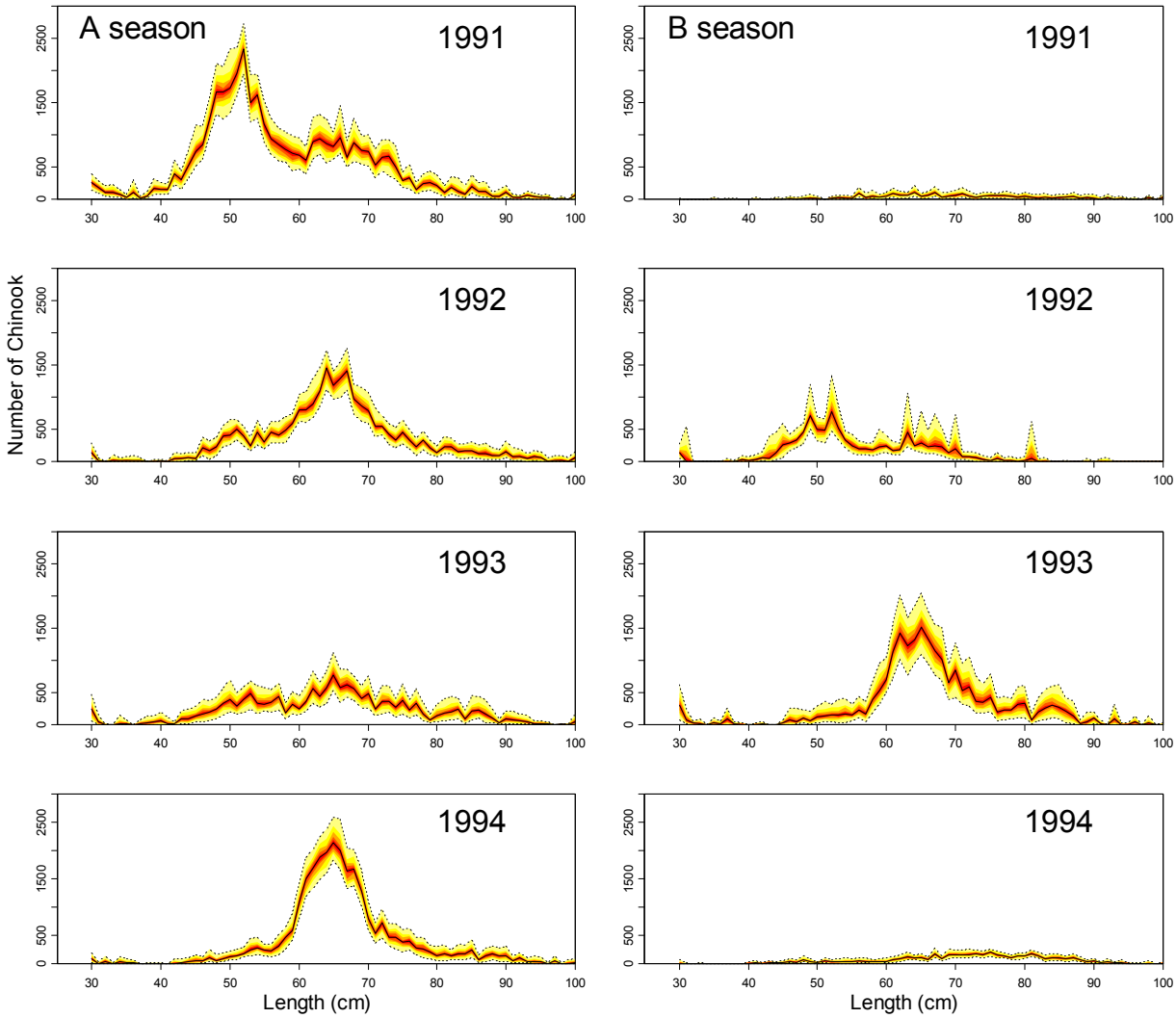

Fig. 3-2 Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

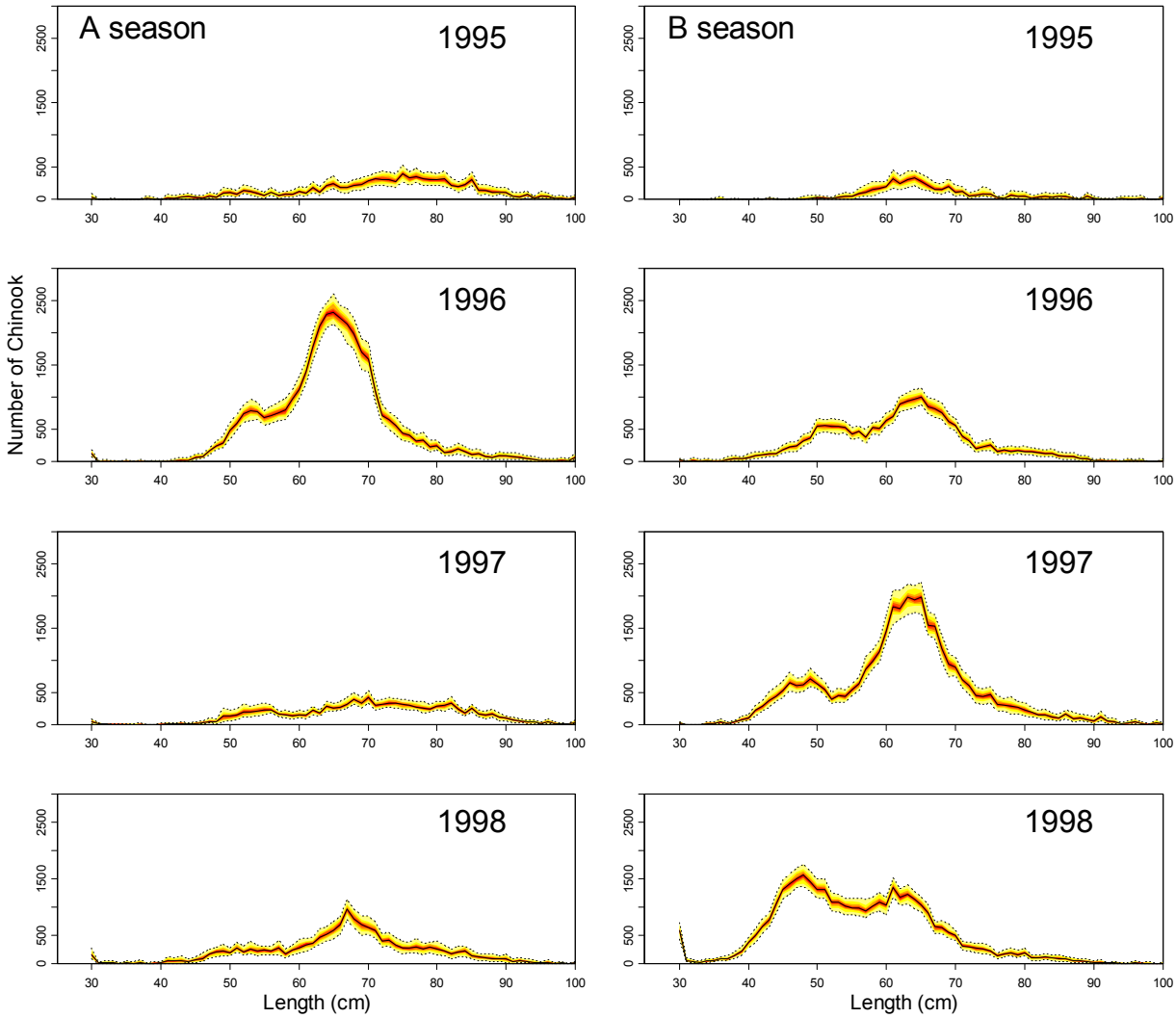

Fig. 3-2 (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

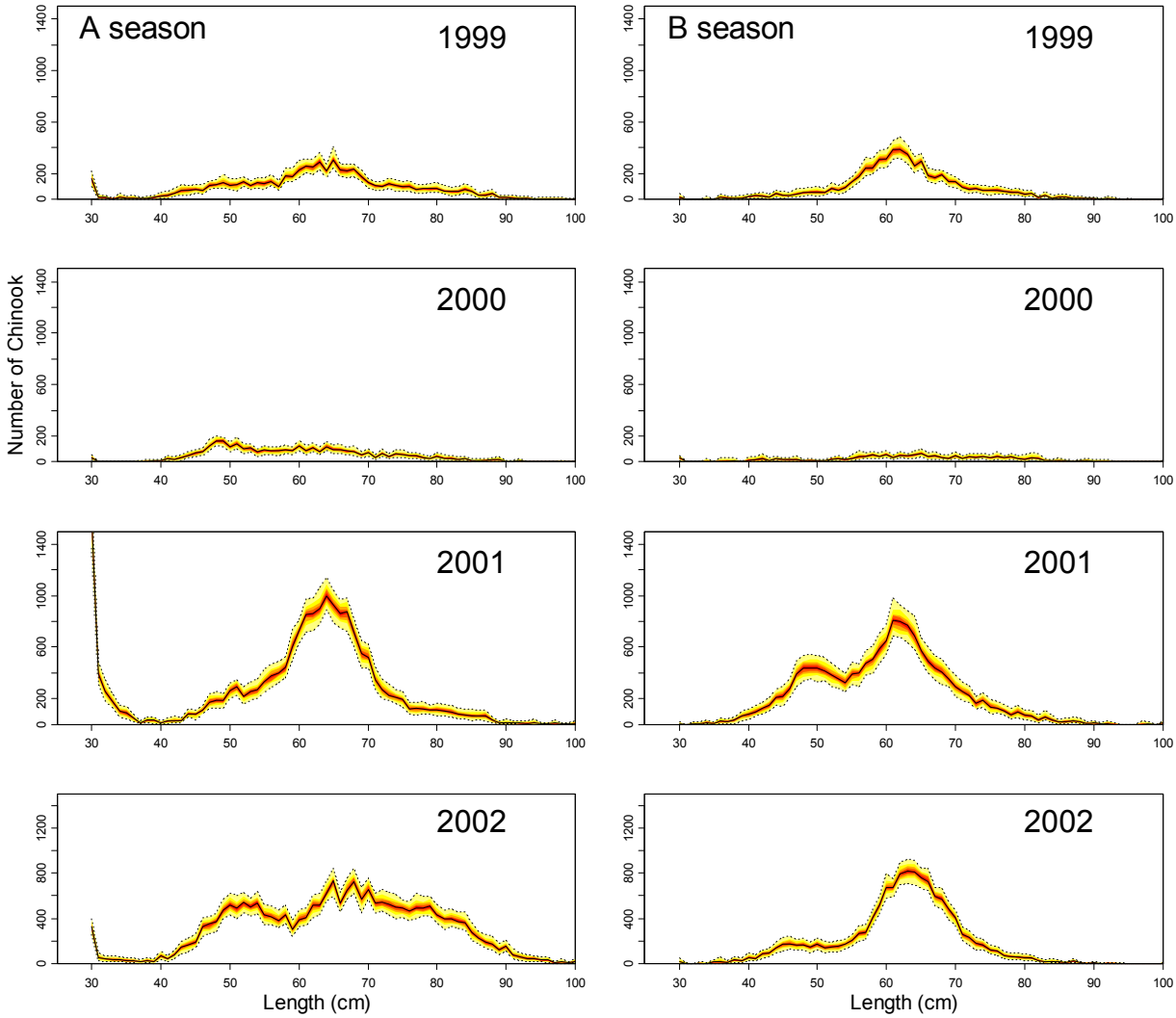

Fig. 3-2 (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

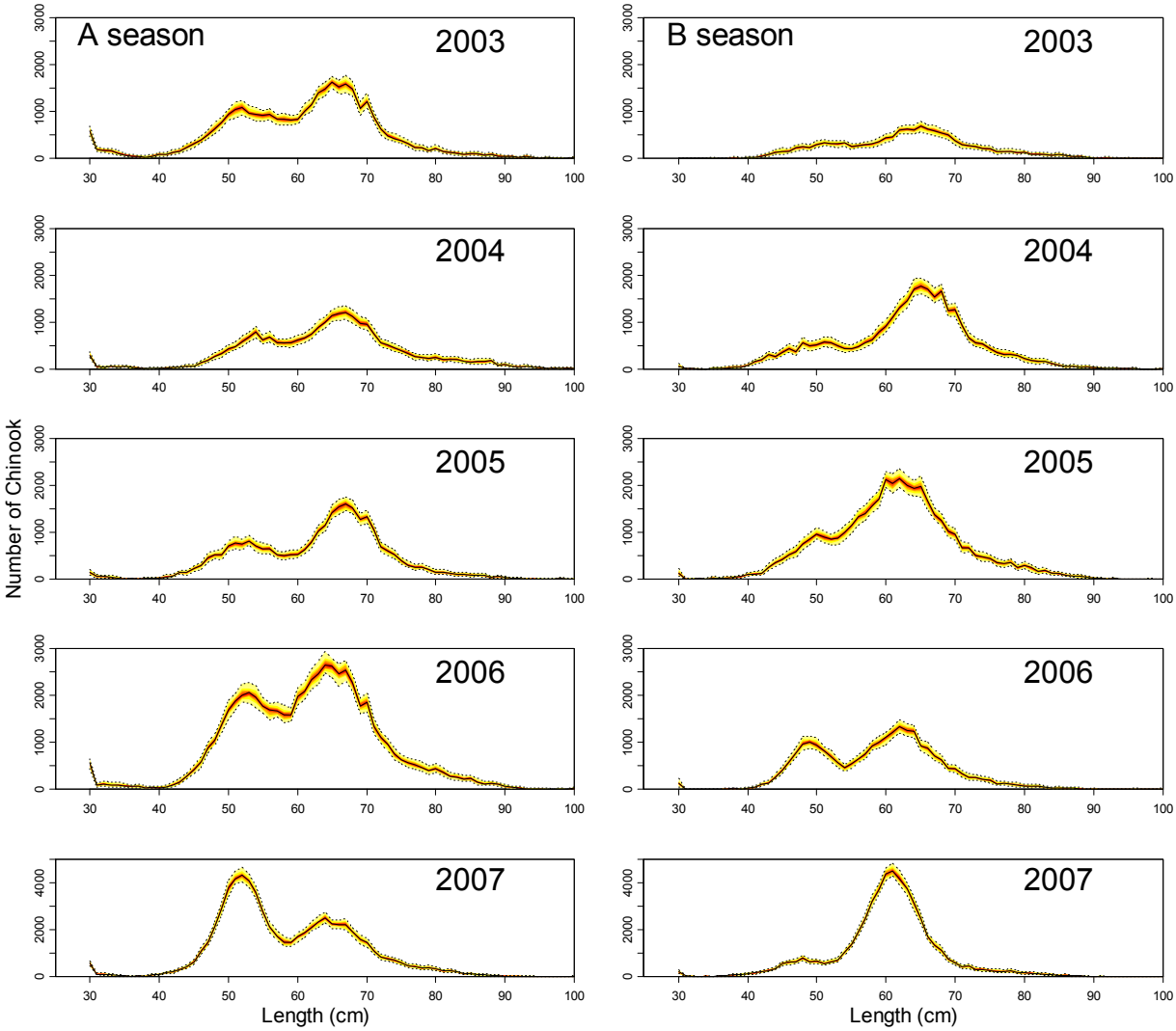

Fig. 3-2 (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

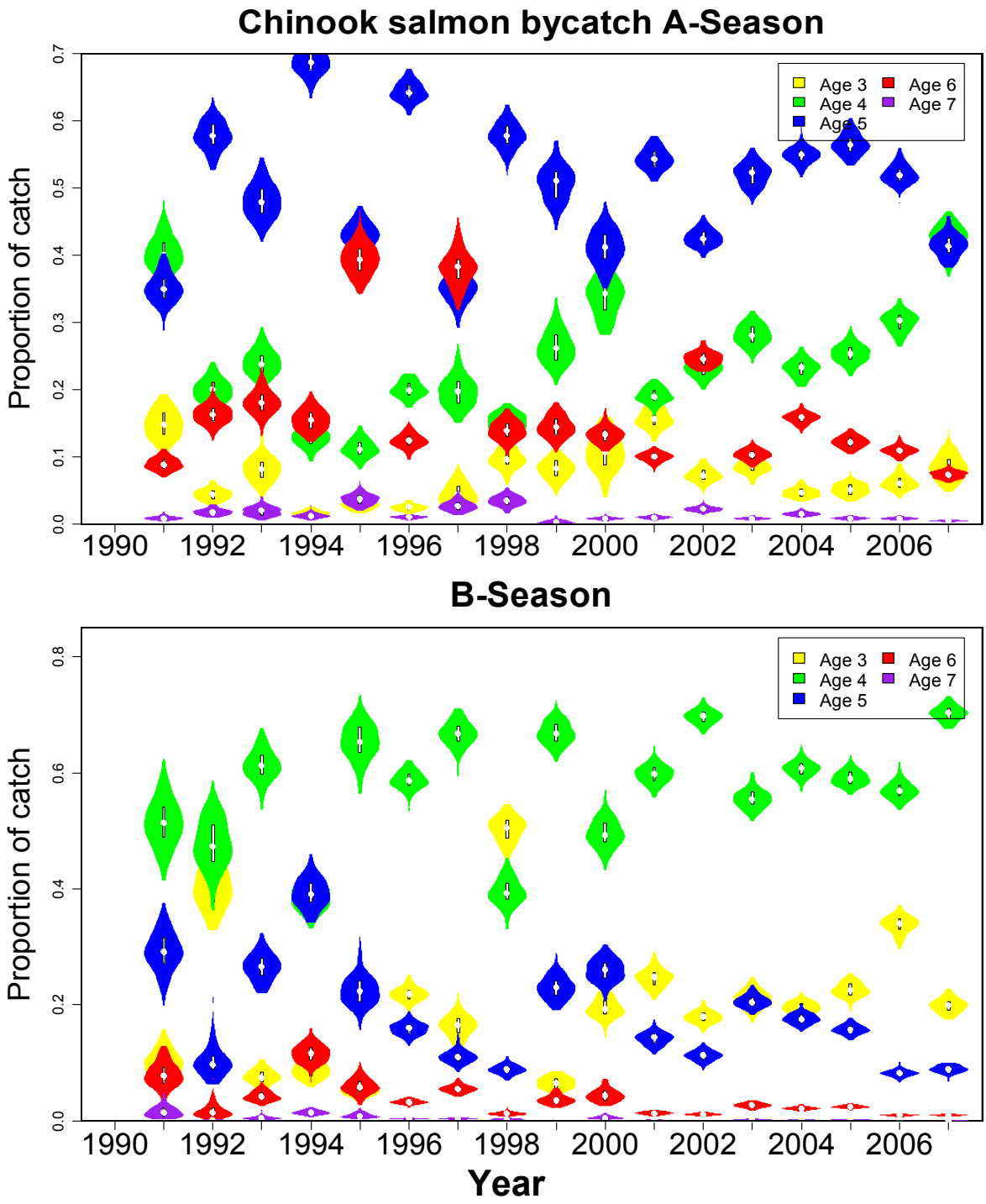

Fig. 3-3 Chinook salmon bycatch age composition by year and A-season (top) and B-season (bottom). Vertical spread of blobs represent uncertainty as estimated from the two-stage bootstrap re-sampling procedure.

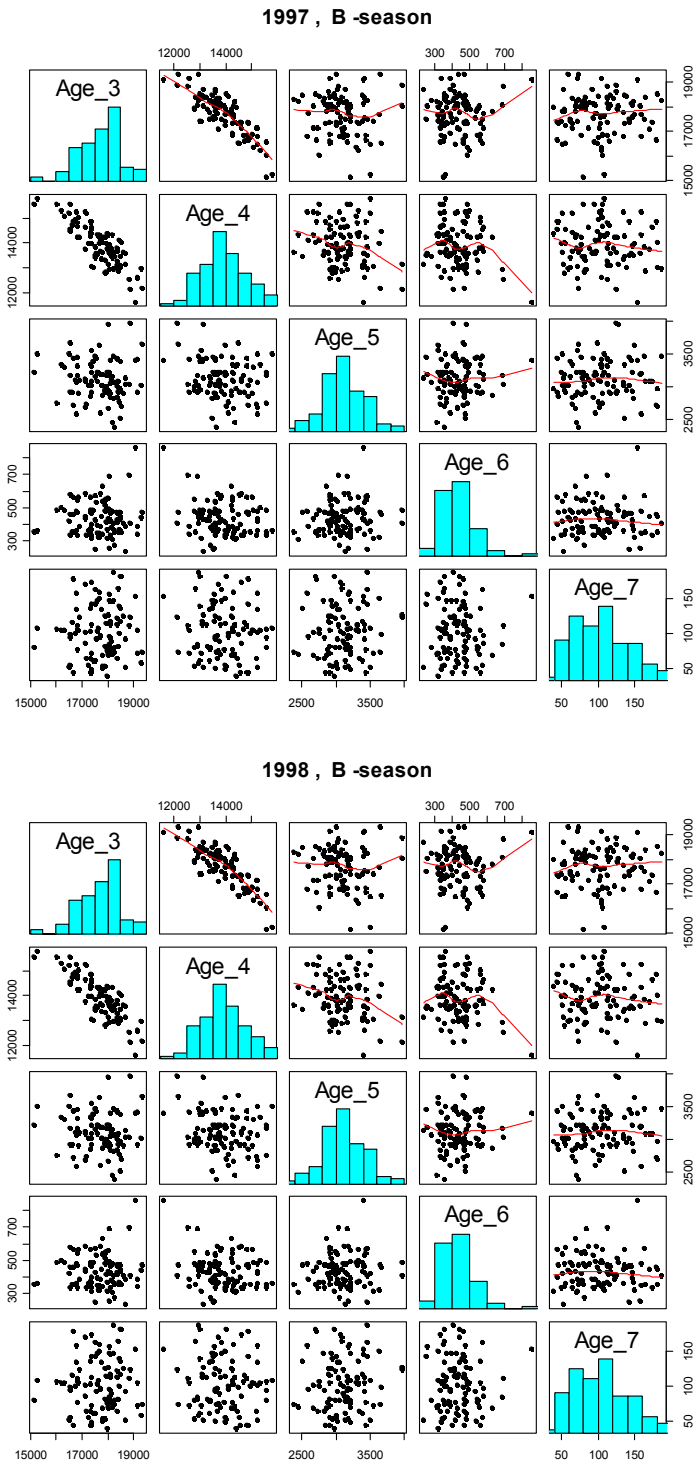

Fig. 3-4 Bootstrap estimates of Chinook salmon bycatch example showing correlation of bycatch at different ages for the B-season in 1997 (top) and 1998 (bottom).

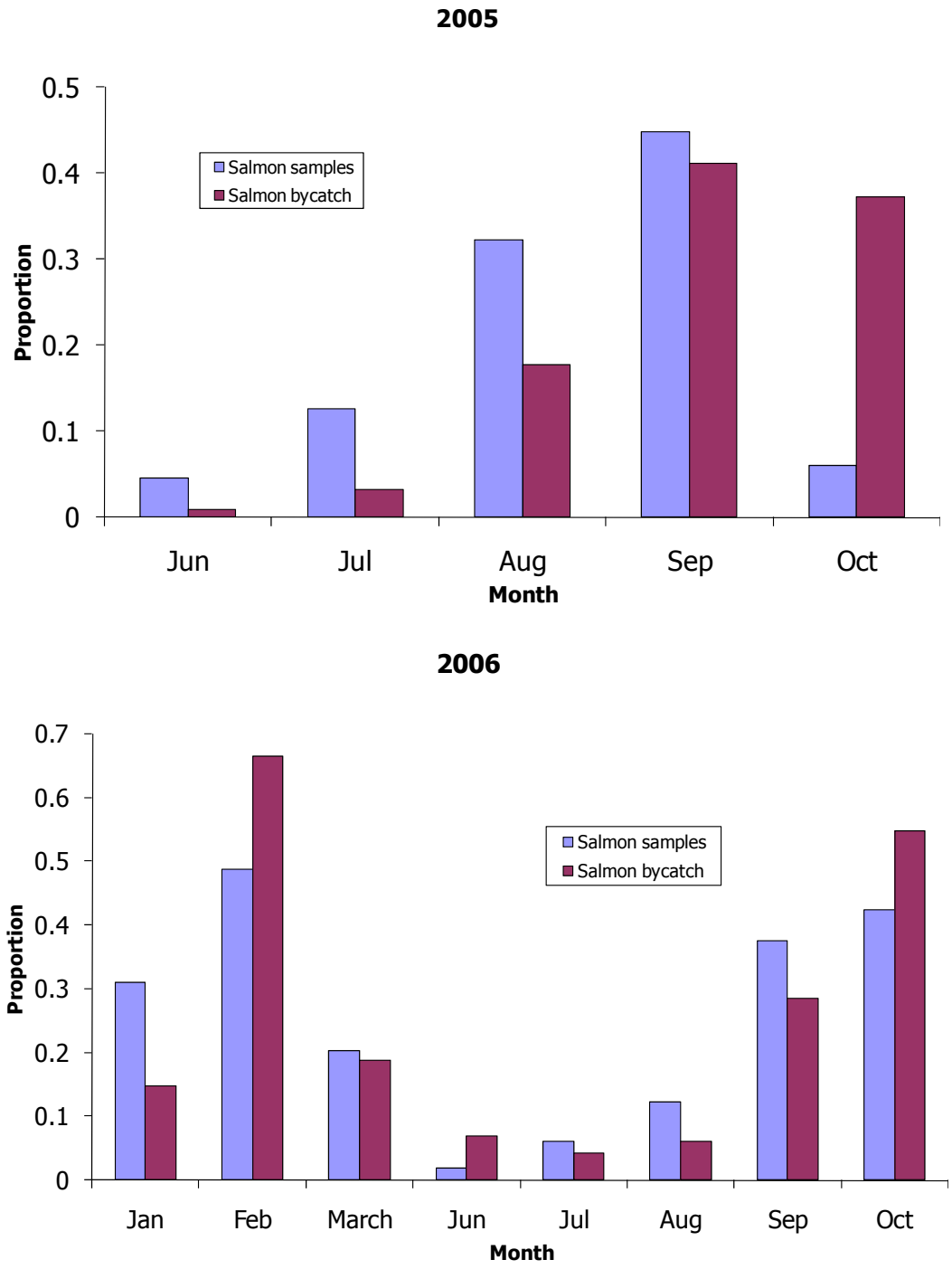

Fig. 3-5 Proportion of Chinook salmon samples collected for genetics compared to the proportion of bycatch by month for 2005 B-season only (top panel) and 2006 A and B season combined (bottom panel).

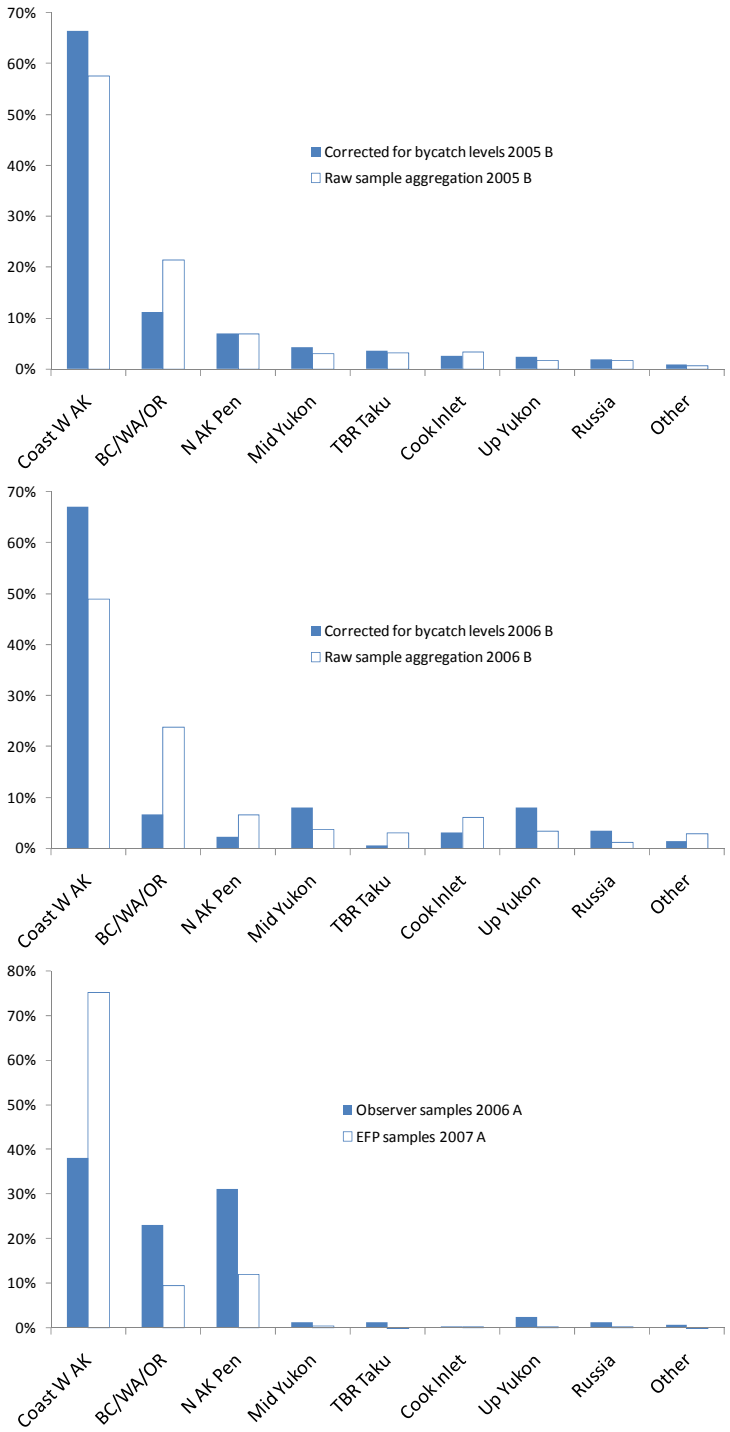

Fig. 3-6 Chinook salmon bycatch results by reporting region for 2005 B season (top), 2006 B season (middle), and the 2006 and (partial sample) of 2007 A seasons (bottom). The top two panels include uncorrected results where bycatch differences between regions (east and west of 170°W) are ignored (empty columns).

3.3.3 Estimating adult equivalence

The impact of bycatch on salmon runs is the primary output statistic. This measure relates the historical bycatch levels relative to the subsequent returning salmon run *k* in year *t* as:

$$u_{t,k} = \frac{AEQ_{t,k}}{AEQ_{t,k} + S_{t,k}} \qquad (1)$$

where $AEQ_{t,k}$ and $S_{t,k}$ are the adult-equivalent bycatch and stock size (run return) estimates of the salmon species in question, respectively. The calculation of $AEQ_{t,k}$ includes the bycatch of salmon returning to spawn in year *t* and the bycatch from previous years for the same brood year (i.e., at younger, immature ages). This latter component needs to be decremented by ocean survival rates and maturity schedules. The impact of current year and previous years bycatch on salmon returning (as adult equivalents in year *t*) can be expressed in expanded form (without stock specificity) as:

$$\begin{aligned}
AEQ_t = & \sum_{a=3}^{7} c_{t,a}\gamma_a + \\
& \gamma_4(1-\gamma_3)s_3 c_{t-1,3} + \\
& \gamma_5(1-\gamma_4)(1-\gamma_3)s_3 s_4 c_{t-2,3} + \\
& \gamma_6(1-\gamma_5)(1-\gamma_4)(1-\gamma_3)s_3 s_4 s_5 c_{t-3,3} + \\
& \gamma_7(1-\gamma_6)(1-\gamma_5)(1-\gamma_4)(1-\gamma_3)s_3 s_4 s_5 s_6 c_{t-4,3} + \\
& \\
& \gamma_5(1-\gamma_4)s_4 c_{t-1,4} + \\
& \gamma_6(1-\gamma_5)(1-\gamma_4)s_4 s_5 c_{t-2,4} + \\
& \gamma_7(1-\gamma_6)(1-\gamma_5)(1-\gamma_4)s_4 s_5 s_6 c_{t-3,4} + \\
& \\
& \gamma_6(1-\gamma_5)s_5 c_{t-1,5} + \\
& \gamma_7(1-\gamma_6)(1-\gamma_5)s_5 s_6 c_{t-2,5} + \\
& \\
& \gamma_7(1-\gamma_6)s_6 c_{t-1,6}
\end{aligned} \qquad (2)$$

where $c_{t,a}$ is the bycatch of age *a* salmon in year *t*, s_a is the proportion of salmon surviving from age *a* to *a+1,* and γ_a is the proportion of salmon at sea that will return to spawn at age *a.* Since this model is central to the calculation of *AEQ* values, an explanatory schematic is given in Fig. 3-7). Maturation rates vary over time and among stocks detailed information on this is available from a wide variety of sources. For the purpose of this study, an average over putative stocks was developed based on a variety of studies (Table 3-13). Note that there is a distinction between the distribution of mature age salmon found in rivers (Table 3-13) and the expected age-specific maturation rate of oceanic salmon ($\gamma_{a,k}$) used in this model. However, given ocean survival rates the values for $\gamma_{a,k}$ can be solved which satisfy the age-specific maturation averaged over different stocks (bottom row of Table 3-13).

To carry out the computations in a straightforward manner, the numbers of salmon that remain in the ocean (i.e., they put off spawning for at least another year) are tracked through time until age 7 where for this model, all Chinook in the ocean at that age are considered mature and will spawn in that year.

Stochastic versions of the adult equivalence calculations acknowledge both run-size inter-annual variability and run size estimation error, as well as uncertainty in maturation rates, the natural mortality

rates (oceanic), river-of-origin estimates, and age assignments. The variability in run size can be written as (with $\dot{S}_{t,k}$ representing the stochastic version of $S_{t,k}$):

$$\dot{S}_{t,k} = \bar{S}_k e^{\varepsilon_t + \delta_t} \quad \varepsilon_t \sim N\left(0, \sigma_1^2\right), \quad \delta_t \sim N\left(0, \sigma_2^2\right) \tag{3}$$

where σ_1^2, σ_2^2 are specified levels of variability in inter-annual run sizes and run-size estimation variances, respectively. Note that for the purposes of this EIS, estimates of run sizes were unavailable for some stocks hence this method is described here for conceptual purposes only.

The stochastic survival rates were simulated as:

$$\dot{s}_a = 1 - \exp\left(-M_a + \delta\right), \qquad \delta \sim N\left(0, 0.1^2\right) \tag{4}$$

whereas the maturity in a given year and age was drawn from beta-distributions:

$$\dot{\gamma}_a \sim B\left(\alpha_a, \beta_a\right) \tag{5}$$

with parameters α_a, β_a specified to satisfy the expected value of age at maturation (Table 3-13) and a pre-specified coefficient of variation term (provided as model input).

Similarly, the parameter responsible for assigning bycatch to river-system of origin was modeled using a combination of years and "parametric bootstrap" approach, also with the beta distribution:

$$\dot{p}_k \sim B\left(\alpha_k, \beta_k\right) \tag{6}$$

again with α_k, β_k specified to satisfy the expected value the estimates and variances shown in Table 3-1. For the purposes of this study, the estimation uncertainty is considered as part of the inter-annual variability in this parameter. The steps (implemented in a spreadsheet) for the AEQ analysis can be outlined as follows:

1. Select a bootstrap sample of salmon bycatch-at-age ($c_{t,a}$) for each year from the catch-age procedure described above;
2. Sum the bycatch-at-age for each year and proceed to account for year-of-return factors (e.g., stochastic maturation rates and ocean survival (Eqs. 2-5);
3. Partition the bycatch estimates to stock proportions (by year and area) drawn randomly from each parametric bootstrap;
4. Store stratum-specific AEQ values for each year;
5. Repeat 1-4 200 times;
6. Based on updated genetics results, assign to river of origin components ($\dot{p}_k$, Eq. 6).
7. Compile results over all years and compute frequencies from which relative probabilities can be estimated;

Sensitivity analyses on maturation rates by brood year were conducted and contrasted with alternative assumptions about natural mortality (M_a) schedules during their oceanic phase as follows:

Model	3	4	5	6	7
1 - None	0.0	0.0	0.0	0.0	0.0
2 - Variable	0.3	0.2	0.1	0.05	0.0
3 - Constant	0.2	0.2	0.2	0.2	0.0

The pattern of bycatch relative to AEQ is variable and relatively insensitive to mortality assumptions (Fig. 3-10). For simplicity in presenting the analysis, subsequent values are based on the intermediate age-specific natural mortality (Model 2). The corresponding age-specific probabilities that a salmon would return to spawn (given the in-river mature population proportions shown in Table 3-13) are:

Age	3	4	5	6	7
Maturation probability (γ_a)	0.059	0.273	0.488	0.908	1.000

Notice that in some years, the bycatch records may be below the actual AEQ due to the lagged impact of previous years catches (e.g., in 1999 and 2000). A similar result would be predicted for AEQ model results in 2008 regardless of actual bycatch levels in this year due to the cumulative effect of bycatch prior to 2008, and particularly the impact of bycatch levels in 2007 as that will continue to impact the AEQ (and thus subsequent returns to river systems) for several years.

Overall, the estimate of AEQ Chinook mortality from 1994-2007 ranged from about 15,000 fish to over 78,000 with the largest contribution of the mortality comprised of stocks in the coastal west-Alaska (Table 3-14). Note that the intent here is to show that annual stock composition estimates of the bycatch is affected by the seasons and areas when and where bycatch occurs. Note that these results are based on the assumption that the genetics findings from the 2005-2007 data represent the historical pattern of bycatch stock composition (by strata).

Evaluations of alternative Chinook salmon caps were done based on re-casting historical catch levels as if a cap proposal had been implemented. Since the alternatives all have specific values by season and sector, the effective limit on Chinook bycatch levels can vary for each alternative and over different years. This is caused by the distribution of the fleet relative to the resource and the variability of bycatch rates by season and years. To capture the effect of an alternative policy, the 2003-2007 mean "effective" cap for each alternative was computed, and used as the seasonal limit for evaluation purposes (Table 3-15). These values were then used in the AEQ simulation model as season-specific caps. This means that the minimum of the historical season-specific bycatch and the effective cap level given in Table 3-15 was applied for estimating the AEQ for each policy.

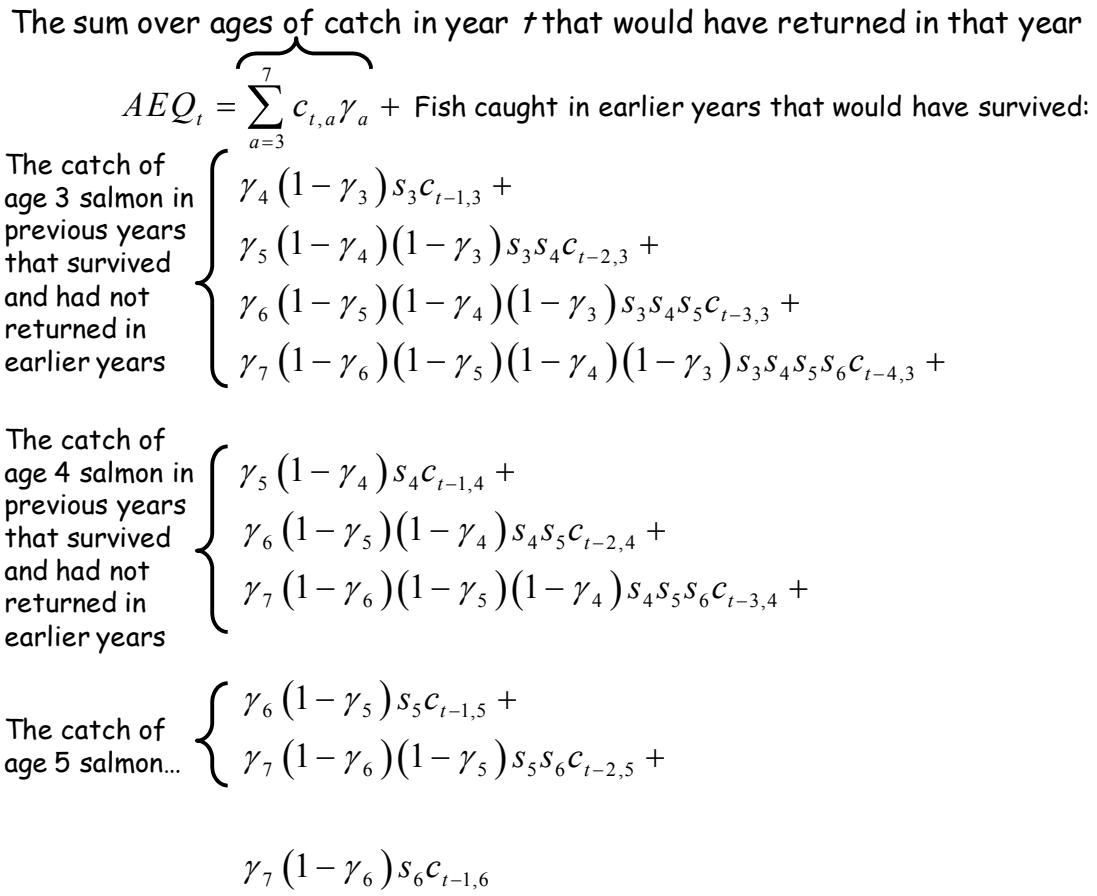

Fig. 3-7 Explanatory schematic of main AEQ equation. Symbols are defined in text.

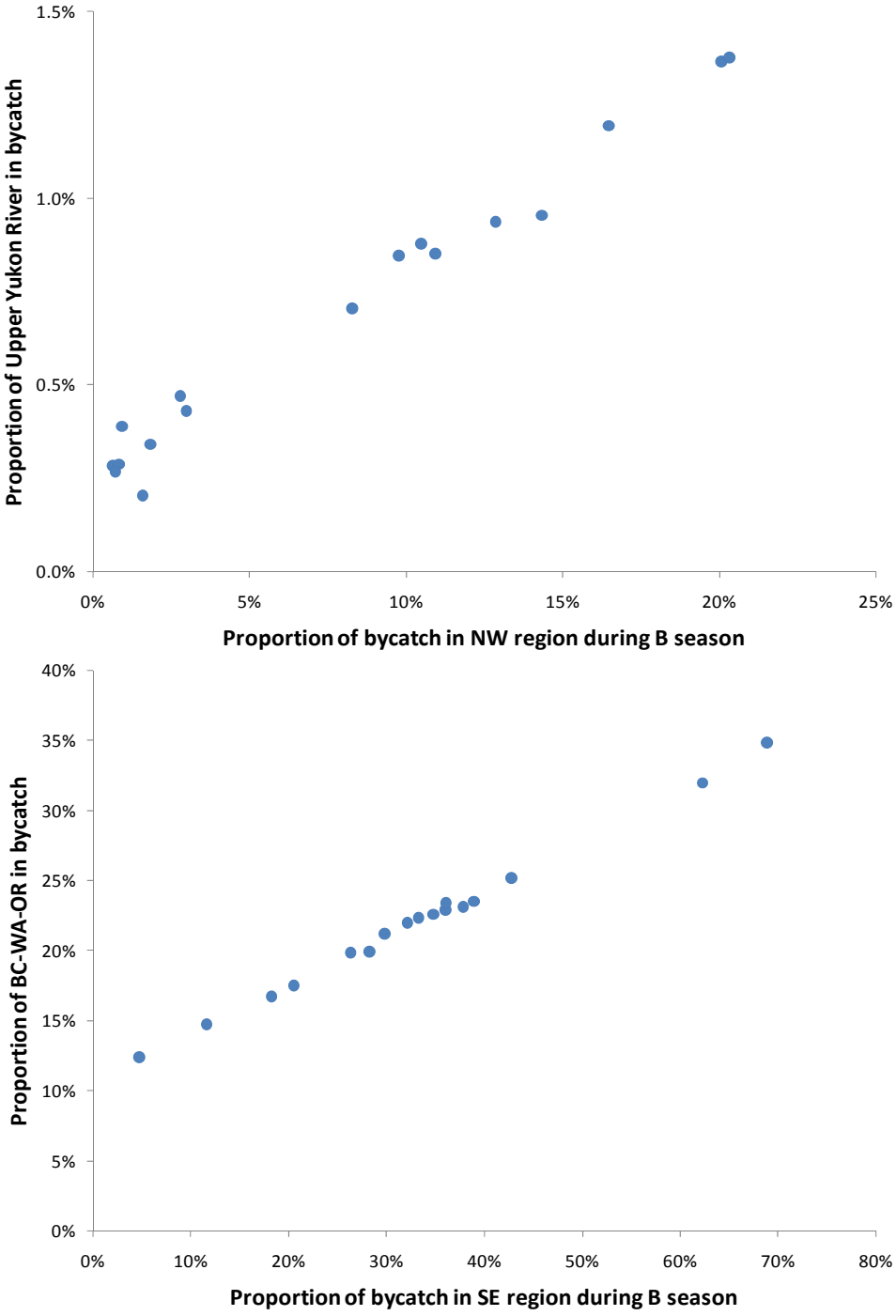

Fig. 3-8 Figure showing how the overall proportion of Upper Yukon River relates to the bycatch proportion that occurs in the NW region (west of 170°W; top panel) and how the proportion of the BC-WA-OR (PNW) relates to the SE region (east of 170°W; bottom panel) during the summer-fall pollock fishery, 1991-2007.

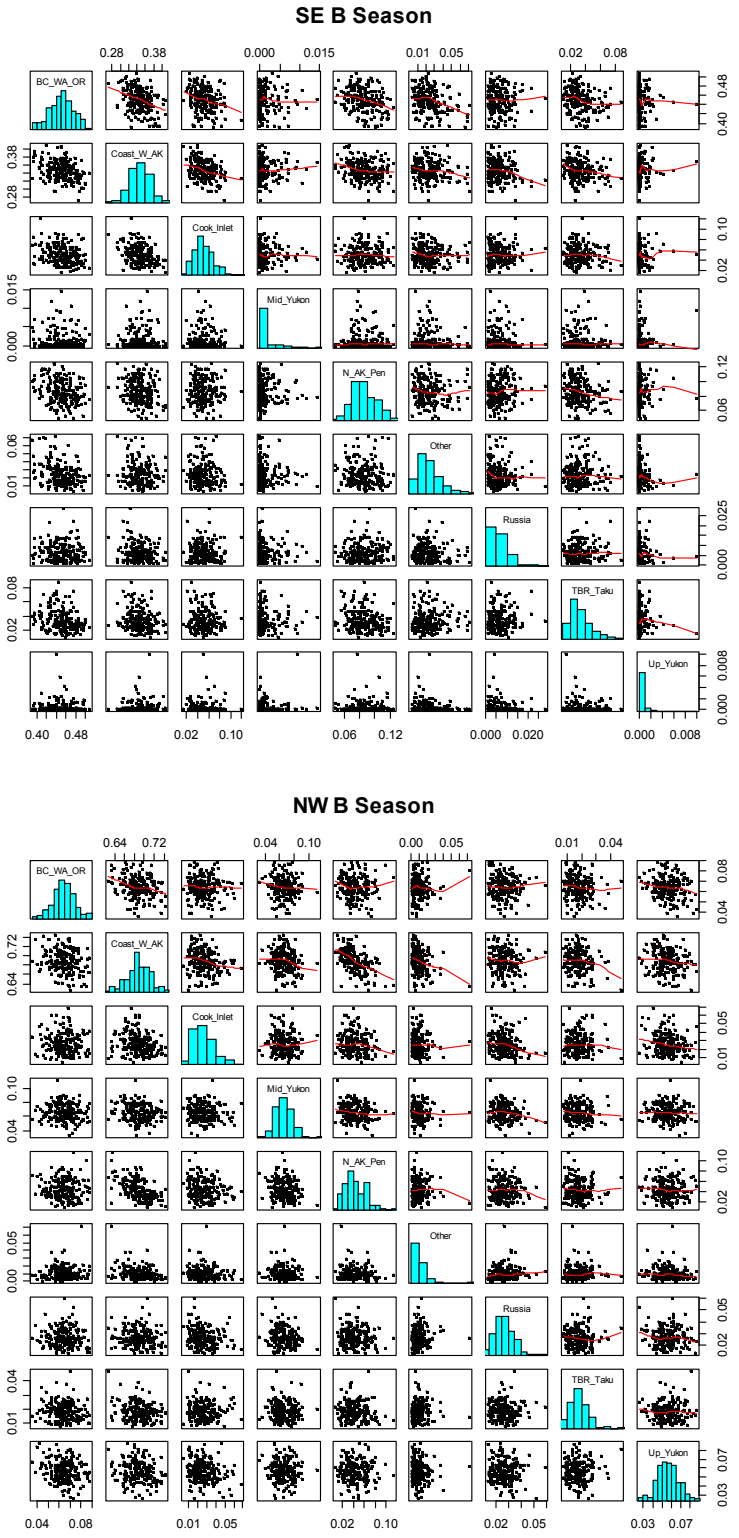

Fig. 3-9 Simulated Chinook salmon stock proportion by region for the B season based on reported standard error values from ADF&G analyses and assuming that the 2006 data has better coverage and is hence weighted 2:1 compared to the 2005 B-season data.

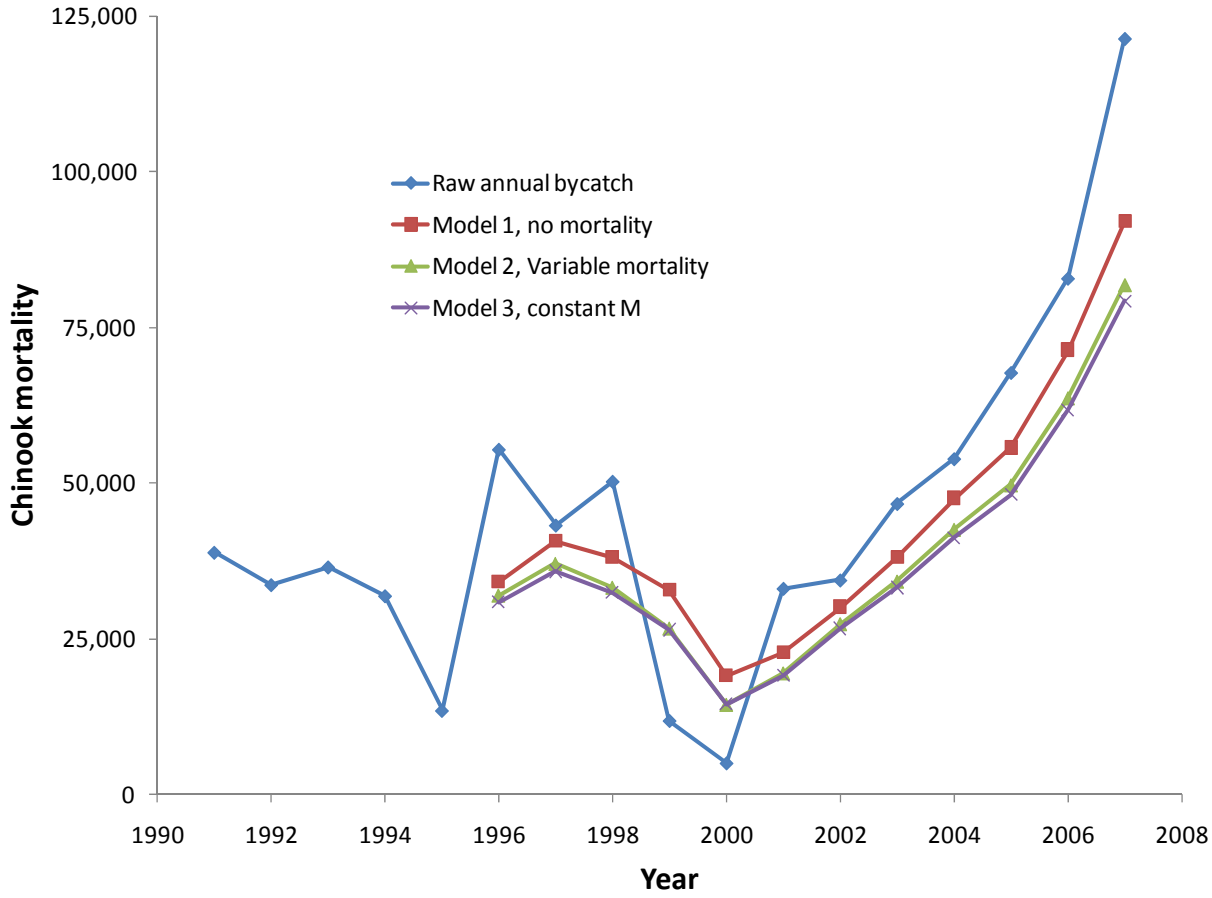

Fig. 3-10 Time series of Chinook adult equivalent bycatch from the pollock fishery, 1991-2007 compared to the annual totals under different assumptions about ocean mortality rates.

Table 3-13 Range of estimated mean age-specific maturation by brood year used to compute adult equivalents. The weighted mean value is based on the relative Chinook run sizes between the Nushagak and Yukon Rivers since 1997. *Sources: Healey 1991, Dani Evenson (ADF&G pers. comm.), Rishi Sharma (CRITFC, pers. comm.).*

	Weight	Age 3	Age 4	Age 5	Age 6	Age 7
Yukon	2.216	1%	13%	32%	49%	5%
Nushagak since 82	1.781	1%	21%	38%	39%	2%
Nushagak since 66	0	0%	17%	36%	43%	3%
Goodnews	0	0%	20%	31%	45%	4%
SE Alaska (TBR)	0.3	0%	18%	40%	37%	5%
BC, WA, OR, & CA	0.7	3%	28%	53%	14%	1%
Weighted mean		1%	18%	37%	40%	3%

Table 3-14 Median values of stochastic simulation results of AEQ Chinook mortality attributed to the pollock fishery by region, 1994-2007. These simulations include stochasticity in natural mortality (Model 2, CV=0.1), bycatch age composition (via bootstrap samples), maturation rate (CV=0.1), and stock composition (as detailed above). NOTE: these results are based on the assumption that the genetics findings from the 2005-2007 data represent the historical pattern of bycatch stock composition (by strata).

	BC, WA, OR, and CA	Coastal W. AK	Cook Inlet	Middle Yukon	N. Alaska Peninsula	Other	Russia	Upper Yukon	TBR (SE)	Total
1994	5,198	21,518	242	201	4,898	714	147	194	198	33,310
1995	5,635	14,084	415	104	3,302	532	112	96	279	24,559
1996	6,974	17,025	520	154	3,939	632	142	137	364	29,886
1997	11,376	16,895	1,276	413	3,364	715	277	343	783	35,442
1998	10,967	14,218	1,110	103	3,382	696	165	87	711	31,439
1999	6,429	15,099	573	297	3,193	561	188	245	387	26,973
2000	2,815	9,383	219	167	2,106	330	99	147	152	15,418
2001	3,694	10,473	349	260	2,141	375	149	221	238	17,899
2002	6,236	14,516	509	106	3,467	609	117	96	341	25,997
2003	5,743	20,065	398	356	4,424	679	207	311	292	32,475
2004	10,164	21,904	1,018	466	4,592	859	305	393	685	40,386
2005	11,169	25,462	1,203	767	5,107	923	439	645	772	46,487
2006	12,719	36,337	892	363	8,355	1,348	290	339	633	61,275
2007	18,079	44,380	1,597	694	9,743	1,688	485	608	1,069	78,344

Table 3-15 Chinook salmon effective bycatch "caps" in the pollock fishery by season (A and B) based on average values of the caps (if they occurred) had they been applied from 2003-2007.

Cap, A/B, sector	A season	B season	Total
PPA Scenario 1 w/ transfer	46,561	20,372	66,933
PPA Scenario 1 w/o transfer	44,974	20,372	65,346
PPA Scenario 2 w/ transfer	33,010	13,500	46,510
PPA Scenario 2 w/o transfer	31,809	13,500	45,309
87,500 50/50 opt2a	31,950	32,844	64,793
87,500 50/50 opt2d	36,899	28,791	65,690
87,500 58/42 opt1	44,118	20,321	64,439
87,500 58/42 opt2a	41,653	30,463	72,116
87,500 58/42 opt2d	42,234	24,258	66,492
87,500 70/30 opt1	49,368	16,277	65,644
87,500 70/30 opt2a	44,665	18,427	63,092
87,500 70/30 opt2d	55,376	17,815	73,191
68,100 50/50 opt1	27,784	18,272	46,056
68,100 50/50 opt2a	26,459	28,264	54,723
68,100 50/50 opt2d	25,196	24,258	49,455
68,100 58/42 opt1	29,569	17,581	47,150
68,100 58/42 opt2a	28,587	21,247	49,834
68,100 58/42 opt2d	32,676	19,997	52,674
68,100 70/30 opt1	41,021	13,253	54,274
68,100 70/30 opt2a	35,980	15,495	51,475
68,100 70/30 opt2d	42,234	14,640	56,874
48,700 50/50 opt1	19,292	16,196	35,488
48,700 50/50 opt2a	18,053	17,439	35,493
48,700 50/50 opt2d	21,242	16,725	37,966
48,700 58/42 opt1	21,142	13,253	34,394
48,700 58/42 opt2a	19,592	15,495	35,087
48,700 58/42 opt2d	23,610	14,640	38,250
48,700 70/30 opt1	27,784	10,225	38,009
48,700 70/30 opt2a	26,459	12,262	38,721
48,700 70/30 opt2d	25,196	11,612	36,809
29,300 50/50 opt1	9,761	10,225	19,985
29,300 50/50 opt2a	10,637	12,262	22,900
29,300 50/50 opt2d	10,070	11,612	21,682
29,300 58/42 opt1	12,725	8,740	21,465
29,300 58/42 opt2a	12,177	10,520	22,697
29,300 58/42 opt2d	12,031	10,634	22,665
29,300 70/30 opt1	15,120	6,885	22,005
29,300 70/30 opt2a	17,010	7,065	24,074
29,300 70/30 opt2d	14,859	6,775	21,634

Additional References

Dorn, M.W. 1992. Detecting environmental covariates of Pacific whiting *Merluccius productus* growth using a growth-increment regression model. Fish. Bull. 90:260-275.

Kimura, D.K. 1989. Variability in estimating catch-in-numbers-at-age and its impact on cohort analysis. *In* R.J. Beamish and G.A. McFarlane (eds.), Effects on ocean variability on recruitment and an evaluation of parameters used in stock assessment models. Can. Spec. Publ. Fish. Aq. Sci. 108:57-66.

Appendix 2 – Revised Section 3.4 Consideration of future actions

3.4 Consideration of Future Actions

An environmental impact statement must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA define cumulative effects as:

> *"the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7*)."

In this EIS, relevant past and present actions are identified and integrated into the impacts analysis for each resource component in Chapters 4 through 8. Each chapter also includes a section on consideration of future actions to provide the reader with an understanding of the changes in the impacts of the alternatives on each resource component when we take into account the reasonable foreseeable future actions. The discussions relevant to each resource component have been included in each chapter (1) to help each chapter stand alone as a self-contained analysis, for the convenience of the reader, and (2) as a methodological tool to ensure that the threads of each discussion for each resource component remain distinct, and do not become confused.

This section provides a summary description of the reasonably foreseeable future actions that may affect resource components and that also may be affected by the alternatives in this analysis. These include future actions that may affect the Bering Sea pollock fishery, the salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on the resources components analyzed in this EIS. The actions in the list have been grouped in the following four categories:

- Ecosystem-sensitive management
- Traditional management tools
- Actions by other Federal, State, and international agencies
- Private actions

The "action area" for salmon bycatch management includes the Federal waters of the Bering Sea. Impacts of the action may occur outside the action area in salmon freshwater habitats and along salmon migration routes.

Table 3-16 summarizes the reasonably foreseeable "actions" identified in this analysis that are likely to have an impact on a resource component within the action area and timeframe. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). Identification of actions likely to impact a resource component, or change the impacts of any of the alternatives, within this action's area and time frame will allow the public and Council to make a reasoned choice among alternatives.

CEQ regulations require a consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This is interpreted as indicating actions that are more than merely possible or speculative. Actions have been considered reasonably foreseeable if some concrete step has

been taken toward implementation, such as a Council recommendation or the publication of a proposed rule. Actions simply "under consideration" have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen.

Table 3-16 Reasonably foreseeable future actions

Ecosystem-sensitive management	• Ongoing Research to understand the interactions between ecosystem components • Increasing protection of ESA-listed and other non-target species • Increasing integration of ecosystems considerations into fisheries management
Traditional management tools	• Authorization of pollock fishery in future years • Increasing enforcement responsibilities • Technical and program changes that will improve enforcement and management • Development of a Salmon Excluder Device
Other Federal, State, and international agencies	• State management of salmon fisheries • Hatchery release of salmon • Future exploration and development of offshore mineral resources • Expansion and construction of boat harbors • Other State actions
Private actions	• Commercial pollock and salmon fishing • CDQ investments in western Alaska • Subsistence harvest of Chinook salmon • Sport harvest of Chinook salmon • Increasing levels of economic activity in Alaska's waters and coastal zone

3.4.1 Ecosystem-sensitive management[1]

3.4.1.1 Ongoing research to understand the interactions between ecosystem components

Researchers are learning more about the components of the ecosystem, the ways these interact, and the impacts of fishing activity on them. Research topics include cumulative impacts of climate change on the ecosystem, the energy flow within an ecosystem, and the impacts of fishing on the ecosystem components. Ongoing research will improve the interface between science and policy-making and facilitate the use of ecological information in making policy. Many institutions and organizations are conducting relevant research.

Recent fluctuations in the abundance, survival, and growth of salmon in the Bering Sea have added significant uncertainty and complexity to the management of Bering Sea salmon resources. Similar fluctuations in the physical and biological oceanographic conditions have also been observed; however, the limited information on Bering Sea salmon ecology was not sufficient to adequately identify

[1] The term "ecosystem-sensitive management" is used in this EIS in preference to the terms "ecosystem-based management" and "ecosystem approaches to management." The term was chosen to indicate a wide range of measures designed to improve our understanding of the interactions between groundfish fishing and the broader ecosystems, to reduce or mitigate the impacts of fishing on the ecosystems, and to modify fisheries governance to integrate ecosystems considerations into management. The term was used because it is not a term of art or commonly used term which might have very specific meanings. When the term "ecosystem-based management" is used, it is meant to reflect usage by other parties in public discussions.

mechanisms linking recent changes in ocean conditions to salmon resources. North Pacific Anadromous Fish Commission (NPAFC) scientists responded by developing BASIS (Bering-Aleutian Salmon International Survey), a comprehensive survey of the Bering Sea pelagic ecosystem. BASIS was designed to improve our understanding of salmon ecology in the Bering Sea and to clarify mechanisms linking recent changes in ocean conditions with salmon resources in the Bering Sea. The Alaska Fisheries Science Center's Ocean Carrying Capacity (OCC) Program is responsible for BASIS research in U.S. waters.

Researchers with the OCC Program have conducted shelf-wide surveys during fall 2002 through 2006 on the eastern Bering Sea shelf as part of the multiyear BASIS research program. The focus of BASIS research was on salmon; however, the broad spatial coverage of oceanographic and biological data collected during late summer and early fall provided insight into how the pelagic ecosystem on the eastern Bering Sea shelf responded to changes in spring productivity. Salmon and other forage fish (e.g., age-0 walleye pollock, Pacific cod, and Pacific herring) were captured with a surface net trawl, zooplankton were collected with oblique bongo tows, and oceanographic data were obtained from conductivity-temperature-depth (CTD) vertical profiles. More information on BASIS is provided in Chapter 5 and is available at the AFSC website at: http://www.afsc.noaa.gov/ABL/occ/ablocc_basis.htm.

In 2008, North Pacific Research Board (NPRB) and National Science Foundation (NSF) began a project for understanding ecosystem processes in the Bering Sea called the Bering Sea Integrated Ecosystem Research Program (BSIERP). Approximately 90 federal, state and university scientists will provide coverage of the entire Bering Sea ecosystem. Scientists will conduct three years of field research on the eastern Bering Sea Shelf, from St. Lawrence Island to the Aleutians, followed by two more years for analysis and reporting. They will study a range of issues, including atmospheric forcing, physical oceanography, and the economic and social impacts on humans and communities of a changing ecosystem. More information on this research project is available on the NPRB web site at: http://bsierp.nprb.org/index.htm.

Additionally, ecosystem protection is supported by an extensive program of research into ecosystem components and the integrated functioning of ecosystems, carried out at the AFSC. The AFSC's Fishery Interaction Team (FIT), formed in 2000 to investigate the ecological impacts of commercial fishing, is focusing on the impacts of Pacific cod, pollock, and Atka mackerel fisheries on Steller sea lion populations (Connors and Logerwell 2005). The AFSC's Fisheries and the Environment (FATE) program is investigating potential ecological indicators for use in stock assessment (Boldt 2005). The AFSC's Auke Bay Lab and RACE Division map the benthic habitat on important fishing grounds, study the impact of fishing gear on different types of habitats, and model the relationship between benthic habitat features and fishing activity (Heifetz et al. 2003). Other AFSC ecosystem programs include the North Pacific Climate Regimes and Ecosystem Productivity Program, the Habitat and Ecological Processes program, and the Loss of Sea Ice program (J. Boldt, pers. comm., September 26, 2005). More information on these research programs is available at the AFSC website at: http://www.afsc.noaa.gov.

3.4.1.2 Increasing protection of ESA-listed and other non-target species

Pollock fishing may impact a wide range of other resources, such as seabirds, marine mammals, and non-target species, such as salmon and halibut. Recent Council and NMFS actions suggest that the Council and NMFS may consider measures for protection for ESA-listed and other non-target species.

Changes in the status of species listed under the ESA, the addition of new listed species, designation of critical habitat, and results of future Section 7 consultations may require modifications to pollock fishing practices to reduce the impacts of this fishery on listed species and critical habitat.

The discussion of ESA-listed salmon is in Chapter 5. We are not aware of any changes to the ESA-listed salmon status or designated critical habitat that may affect the future pollock fishery. The impacts of the pollock fishery on ESA-listed salmon are currently limited to the Upper Willamette and Lower Columbia River stocks. The tracking of coded-wire tagged surrogate salmon for ESA-listed stocks may result in additional ESA-listed salmon stocks being identified as potentially impacted by the pollock fisheries. The possible take of any additional ESA-listed salmon stocks would trigger ESA consultation and may result in additional management measures for the pollock fishery depending on the result of the consultation.

Washington State's Sea Grant program is currently working with catcher-processors in the Bering Sea pollock fishery to study the sources of seabird strikes in their operations and to look for ways fishermen can reduce the rate of strikes (Melvin et al. 2004). Other studies are investigating the potential for use of video monitoring of seabird interactions with trawl and longline gear (McElderry et al. 2004; Ames et al. 2005). This research is especially important because action area has very high seabird densities and potential aggregations of ESA-listed short tailed albatross (NMFS 2007b).

The Council is in the process of considering revisions to the Steller sea lion protection measures applicable to the pollock fishery. Since the Steller sea lion protection measures were implemented, extensive scientific research has been conducted to understand the impacts of fisheries on Steller sea lions and life history and foraging activities of these animals. These studies have changed our understanding of Steller sea lion and groundfish fisheries interactions. On October 18, 2005, the Council requested that NMFS reinitiate consultation on the November 2000 Biological Opinion and evaluate all new information that has developed since the previous consultations, including the 2001 Biological Opinion on the Steller sea lion protection measures for the Alaska groundfish fisheries (NMFS 2006). The March 2008 Steller sea lion recovery plan provides a thorough review of the threats to the recovery to the species, the status of the species, and criteria that must be met to down-list and delist the species (NMFS 2008a). NMFS is preparing a new FMP-level Biological Opinion to thoroughly review and synthesize information regarding potential impacts on Steller sea lions and their prey by the groundfish fisheries identified since the previous FMP-level Biological Opinion, the 2001 Biological Opinion, the 2003 supplement, and the recovery plan. From this new information, revisions to the Steller sea lion protection measures may be proposed so that the best scientific information available is used to ensure the fisheries are not likely to result in jeopardy of extinction and destruction or adverse modification of designated critical habitat and to alleviate any unnecessary restrictions for the fleet to improve efficiency and ensure economic viability for the industry. NMFS and the Council would develop an EIS to analyze the impacts of proposed changes to the Steller sea lion protection measures.

Northern fur seals forage in the pelagic area of the Bering Sea and reproduce on the Pribilof and Bogoslof Islands. On June 17, 1988, NMFS declared the northern fur seal stock of the Pribilof Islands, Alaska (St. Paul and St. George Islands), to be depleted under the Marine Mammal Protection Act (MMPA). The Pribilof Islands population was designated depleted because it had declined to less than 50% of levels observed in the late 1950s, and no compelling evidence suggested that carrying capacity has changed substantially since the late 1950s (NMFS 2007a). The EIS for the annual subsistence harvest of fur seals determined that the groundfish fisheries in combination with the subsistence harvest may have a conditional cumulative effect on prey availability if the fisheries were to become further concentrated spatially or temporally in fur seal habitat, especially during June through August (NMFS 2005). The Northern Fur Seal Conservation Plan recommends gathering information on the effects of the fisheries on fur seal prey, including measuring and modeling effects of fishing on prey (both commercial and noncommercial) composition, distribution, abundance, and schooling behavior, and evaluate existing fisheries closures and protected areas (NMFS 2007a). As more information becomes available regarding the interaction between the groundfish fisheries and northern fur seals, fishing restrictions may be necessary to mitigate potential adverse effects.

NMFS has begun a status review to determine if ribbon seals should be listed as threatened or endangered under the ESA (73 FR 16617, March 28, 2008). NMFS received a petition for listing ribbon seals from the Center for Biological Diversity (2007) and found that the petition presents substantial scientific or commercial information indicating that the petition action may be warranted. Ribbon seals are potentially affected by the diminishing sea ice in the Bering Sea and Arctic regions as they are dependent on sea ice for important activities such as resting and reproduction. Listing of this species would require ESA consultation on federal actions that may adversely affect ribbon seals or any designated critical habitat. One ribbon seal has been observed taken in the pollock trawl fishery between 2000 and 2004 (Angliss and Outlaw 2007), and therefore, any listing of this species may require an ESA consultation for the groundfish fisheries and potential protection measures. Although NMFS has prioritized its review of ribbon seals, it has also announced its intention to initiate status reviews for all ice seals, including bearded, ringed, and spotted seals (73 FR 16617, March 28, 2008). On May 28, 2008, the Center for Biological Diversity petitioned NMFS to list bearded, spotted, and ringed seals under the ESA (CBD 2008). The agency's decision on whether to list these species or not is due May 28, 2009.

3.4.1.3 Increasing integration of ecosystems considerations into fisheries management

Ecosystem assessments evaluate the state of the environment, including monitoring climate–ocean indices and species that indicate ecosystem changes. Ecosystem-based fisheries management reflects the incorporation of ecosystem assessments into single species assessments when making management decisions, and explicitly accounts for ecosystem processes when formulating management actions. Ecosystem-based fisheries management may still encompass traditional management tools, such as TACs, but these tools will likely yield different quantitative results.

To integrate such factors into fisheries management, NMFS and the Council will need to develop policies that explicitly specify decision rules and actions to be taken in response to preliminary indications that a regime shift has occurred. These decision rules need to be included in long-range policies and plans. Management actions should consider the life history of the species of interest and can encompass varying response times, depending on the species' lifespan and rate of production. Stock assessment advice needs to explicitly indicate the likely consequences of alternate harvest strategies to stock viability under various recruitment assumptions.

Management strategy evaluations (MSEs) can help in this process. MSEs use simulation models of a fishery to test the success of different management strategies under different sets of fishery conditions, such as shifts in ecosystem regimes. The AFSC is actively involved in conducting MSEs for several groundfish fisheries, including for several flatfish species in the BS, and for pollock in the GOA.

Both the Pew Commission report and the Oceans Commission report point to the need for changes in the organization of fisheries and oceans management to institutionalize ecosystem considerations in policy making (Pew 2003; U.S. Commission on Ocean Policy 2004). The Oceans Commission, for example, points to the need to develop new management boundaries corresponding to large marine ecosystems, and to align decision-making with these boundaries (U.S. Commission on Ocean Policy 2004).

Since the publication of the Oceans Commission report, the President has established a cabinet-level Committee on Ocean Policy by executive order. The Committee is to explore ways to structure government to implement ecosystem-based ocean management (Evans and Wilson 2005). Congress reauthorized the Magnuson-Stevens Act in December 2006 to addresses ecosystem-based management.

NMFS and the Council are continuing to develop their ecosystem management measures for the fisheries in the EEZ off Alaska. NMFS is currently developing national Fishery Ecosystem Plan guidelines. It is

unclear at this time whether these will be issued as guidelines, or as formal provisions for inclusion in the Magnuson-Stevens Act.

The Council has created a committee to research ecosystem developments and to assist in formulating positions with respect to ecosystem-based management. The Council completed a fishery ecosystem plan for the Aleutian Islands ecosystem (NPFMC 2007). An interagency Alaska Marine Ecosystem Forum (AMEF) is improving inter-agency communication on marine ecosystem issues. The Council has signed a Memorandum of Understanding with 10 Federal agencies and 4 State agencies, to create the AMEF. The AMEF seeks to improve communication between the agencies on issues of shared responsibilities related to the marine ecosystems off Alaska's coast. The initial focus of the AMEF will be on the Aleutian Islands marine ecosystem. The SSC has begun to hold annual ecosystem scientific meetings at the February Council meetings.

In addition to these efforts to explore how to develop its ecosystem management efforts, the Council and NMFS continue to initiate efforts to take account of ecosystem impacts of fishing activity. The Council has recommended habitat protection measures for the eastern Bering Sea (73 FR 12357, March 7, 2008). These measures include the Northern Bering Sea Research Area to address potential impacts of shifts in fishing activity to the north.

The Council's Ecosystem Committee discusses ecosystem initiatives and advise the Council on the following issues: (1) defining ecosystem-based management; (2) identifying the structure and Council role in potential regional ecosystem councils; (3) assessing the implications of NOAA strategic planning; (4) drafting guidelines for ecosystem-based approaches to management; (5) drafting Magnuson-Stevens Act requirements relative to ecosystem-based management; and (6) coordinating with NOAA and other initiatives regarding ecosystem-based management. More details are available in the Council's website at http://www.fakr.noaa.gov/npfmc/current_issues/ecosystem/Ecosystem.htm.

The Council is developing Federal fisheries management in the Arctic Management Area. No significant fisheries exist in the Arctic Management Area, either historically or currently. However, the warming of the Arctic and seasonal shrinkage of the sea ice may be associated with increased opportunities for fishing in this region. The Council proposes to develop an Arctic Fishery Management Plan that would (1) close the Arctic to commercial fishing until information improves so that fishing can be conducted sustainably and with due concern to other ecosystem components, (2) determine the fishery management authorities in the Arctic and provide the Council with a vehicle for addressing future management issues, and (3) implement an ecosystem based management policy that recognizes the unique issues in the Alaskan Arctic. The action is necessary to prevent commercial fisheries from developing in the Arctic without the required management framework and scientific information on the fish stocks, their characteristics, and the implications of fishing for the stocks and related components of the ecosystem.

At this writing, while it seems likely that changes in oceans management and associated changes in fisheries management will occur as a result of these discussions and debates, it is not clear what form these new changes will take.

3.4.1.4 Fishery management responses to the effects of climate change

While climate warming trends are being studied and increasingly understood at a global scale (IPCC 2007), the ability for fishery managers to forecast biological responses to changing climate continues to be difficult. The Bering Sea is subject to periodic climatic and ecological "regime shifts." These shifts change the values of key parameters of ecosystem relationships, and can lead to changes in the relative success of different species. The impacts of climate change in the Bering sea, and the related phenomenon of ocean acidification, is addressed in Section 8.4.

The Council and NMFS have taken actions that indicate a willingness to adapt fishery management to be proactive in the face of changing climate conditions. The Council currently receives an annual update on the status and trends of indicators of climate change in the Bering Sea through the presentation of the Ecosystem Assessment and Ecosystem Considerations Report (Boldt 2007). Much of the impetus for Council and NMFS actions in the northern Bering Sea, where bottom trawling is prohibited in the Northern Bering Sea Research Area, and in the Alaskan Arctic, where the Council and NMFS have prohibited all fishing until further scientific study of the impacts of fishing can be conducted, derives from the understanding that changing climate conditions may impact the spatial distribution of fish, and consequently, of fisheries. In order to be proactive, the Council has chosen to close any potential loopholes to unregulated fishing in areas that have not previously been fished.

Consequently, it is likely that as other impacts of climate change become apparent, fishery management will also adapt in response. Because of the large uncertainties as to what these impacts might be, however, and our current inability to predict such change, it is not possible to estimate what form these adaptations may take.

3.4.2 Traditional management tools

3.4.2.1 Authorization of pollock fishery in future years

The annual harvest specifications process for the pollock (and the associated pollock fishery) creates an important class of reasonably foreseeable actions that will take place in every one of the years considered in the cumulative impacts horizon (out to, and including, 2015). Annual TAC specifications limit each year's harvest within sustainable bounds. The overall OY limits on harvests in the BSAI constrain overall harvest of all species. Each year, OFLs, ABCs, and TACs are specified for two years at a time, as described in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b).

The harvest specifications are adopted in accordance with the mandates of the Magnuson-Stevens Act, following guidelines prepared by NMFS, and in accordance with the process for determining overfishing criteria that is outlined in Section 3.2 of each of the groundfish FMPs. Specifications are developed using the most recent fishery survey data (often collected the summer before the fishery opens) and reviewed by the Council and its SSC, AP, and Plan Teams. The process provides many opportunities for public comment. The management process, of which the specifications are a part, is analyzed in an EIS (NMFS 2007b). Each year's specifications and the status of the environment are reviewed to determine the appropriate level of NEPA analysis.

Annual pollock harvests, conducted in accordance with the annual specifications, will impact pollock stocks. Annual harvest activity may change total mortality for the pollock stock, may affect stock characteristics through time by selective harvesting, may affect reproductive activity, may increase the annual harvestable surplus through compensatory mechanisms, may affect the prey for the target species, and may alter EFH.

The annual pollock harvests also impact the environmental components described in this EIS: salmon, non-target fish species, seabirds, marine mammals, and a more general set of ecological relationships. In general, the environmental components are renewable resources, subject to environmental fluctuations. Ongoing harvests of pollock may be consistent with the sustainability of other resource components if the fisheries are associated with mortality rates that are less than or equal to the rates at which the resources can grow or reproduce themselves.

The on-going pollock fishery employs hundreds of fishermen and fish processors, and contributes to the maintenance of human communities, principally in Alaska, Washington, and Oregon.

The number of TAC categories with low values for ABC/OFL is increasing which tends to increase the likelihood that NMFS will close directed fisheries to prevent overfishing. Currently, the NPFMC is considering separating components of the 'other species' category (sharks, skates, octopus, sculpin). Should that occur, incidental catch of sharks for example could impact management of the pollock fishery. As part of the 2006 'other species' incidental catch of 1,973 mt in the pollock fishery, 504 mt were shark. The tier 6 ABC for shark as part of the 'other species' category in 2006 was 463 mt and OFL 617 mt. If sharks were managed as a separate species group under their current tier, the pollock fishery would likely have been constrained in 2006. Managers closely watch species with fairly close amounts between the OFL and ABCs during the fishing year and the fleet will adjust behavior to prevent incurring management actions. While managing the species with separate ABCs and OFLs reduces the potential for overfishing the individual species, the effect of creating more species categories can increase the potential for incurring management measures to prevent overfishing.

3.4.2.2 Increasing enforcement responsibilities

The U.S. Coast Guard (USCG) conducts fisheries enforcement activities in the EEZ off Alaska in cooperation with NOAA Office for Law Enforcement (OLE). New programs to protect resource components from pollock fishery impacts will create additional responsibilities for enforcement agencies. Despite this likely increase in enforcement responsibilities, it is not clear that resources for enforcement will increase proportionately.

The USCG is expected to bear a heavy responsibility for homeland security and is not expected to receive proportionate increases in its budget to accommodate increased fisheries enforcement. Increased responsibilities for homeland security and for detection of increasing drug-smuggling activities in waters off Alaska have limited the resources available for the USCG to conduct enforcement activities at the same level as in the recent past. Any deterrent created by Coast Guard presence in enforcing fisheries regulations and restrictions would likely be reduced, as would the opportunities for detection of fisheries violations at-sea.

Likewise, the NOAA OLE has not recently received increased resources consistent with its increasing enforcement obligations (J. Passer, pers. comm., March 2008). However, new enforcement assistance has become available in recent years through direct Congressional line item appropriations for Joint Enforcement Agreements (JEAs) with all coastal states. The State of Alaska has received approximately $10 million of this funding since 2001, and has used JEA money to purchase capital assets such as patrol vessels and patrol vehicles. The State has also hired new personnel to increase levels of at-sea and dockside enforcement and used JEA money to pay for support and operational expenses pertaining to this increased effort (J. Passer, pers. comm., March 2008).

Uncertainties about Congressional authorization of increased enforcement funding preclude any prediction of trends in the availability of resources to meet increased enforcement responsibilities. Thus, while an increase in responsibilities is reasonably foreseeable, a proportionate increase in funding is not.

3.4.2.3 Technical and program changes that will improve enforcement and management

Managers are increasingly using technology for fisheries management and enforcement. Managers are likely to increase use of vessel monitoring systems (VMS) in coming years. Vessels fishing for pollock in the Bering Sea are required to operate VMS units (50 CFR 679.7(a)(18)). Managers and enforcement

personnel are making extensive use of the information from existing VMS units, and are likely to make more use of it in the future, as they continue to learn how to use it more effectively.

A joint project by NMFS, the State of Alaska, and the IPHC led to electronic landings reporting for groundfish during 2006. When fish are delivered on shore, fishermen and buyers fill out a web-based form with the information on landings. The program generates a paper form for industry and will forward the data to a central repository, where they will be available for use by authorized parties. Electronic reporting allows enforcement staff to look at large masses of data for violations and trends. The web-based input form contains numerous automatic quality control checks to minimize data input errors. The program gets data to enforcement agents more quickly, increases the efficiency of record audits, and makes enforcement activity less intrusive, as agents will have less need to board vessels to review documents onboard, or enter plants to review documents on the premises.

Although rationalization programs increase the monitoring obligations for enforcement, they also improve enforcement and management capabilities by shifting enforcement efforts from the water to dockside for monitoring landings and other records. Moreover, by stabilizing or reducing the number of operations and by creating fishing and processing cooperatives, rationalization reduces the costs of private and joint action by industry to address certain management issues, particularly the monitoring and control of bycatch. For example, in the salmon bycatch monitoring program in the AFA pollock fisheries, fishermen contract together for in-season catch monitoring by a private firm, and agree to restrict fishing activity when bycatch rates rise to defined levels.

Monitoring the catch of pollock and salmon bycatch in the pollock fisheries relies heavily on data collected by NMFS-certified observers. Observer coverage requirements for the pollock fisheries and the use of observer data are described in more detail in the Chapter 10. Observers currently are provided through a system known as “pay-as-you-go” under which vessels operators required to carry a NMFS-certified observer contract directly for observer services with observer providers (businesses who hire and provide observers). The Council and NMFS have been analyzing alternatives for restructuring the North Pacific Groundfish Observer Program to provide a new system for procuring and deploying observers supported by broad-based user fees and/or direct Federal subsidies, in which NMFS would contract directly for observer coverage and be responsible for determining when and where observers should be deployed. This system would address problems associated with the lack of flexibility in the current system to deploy observers when and where needed to collect needed data and the disproportionately high cost of observers for smaller vessels.

The observer restructuring analysis has been on hold since June 2006 as a result of unanswered questions about the potential costs of the restructured program and because revisions to NMFS’s legal authority to collect fees to support a restructured program in the Magnuson-Stevens Act were expected. The Magnuson-Stevens Act was amended in late 2006 to provide the needed revisions to NMFS’s fee collection authority. However, questions still exist about the potential costs of the restructured program.

At its April 2008 meeting, the Council tasked staff to develop a discussion paper about the status of the restructuring analysis and as yet unresolved questions so that the Council could provide further direction on observer program restructuring at its December 2008 meeting. Future revisions to the observer program service delivery model could affect the pollock fisheries. However, this fishery has very high observer coverage levels now to monitor sector, cooperative, and CDQ group level allocations of pollock and further increases in observer coverage requirements are recommended by NMFS to better monitor salmon bycatch under some alternatives in this EIS. While some alternatives under consideration in the observer restructuring analysis could result in increased observer coverage costs for vessels that participate in the AFA fisheries, it is unlikely that any future changes in the observer program would lead to a decrease in observer coverage in the Bering Sea pollock fisheries or any reduction in the quality and

quantity of observer data that would be collected to support this fishery or any of the salmon bycatch alternatives in this EIS.

NMFS is investigating the use of shipboard video monitoring to ensure compliance with full retention requirements in other regions. In the Alaska Region, NMFS has implemented video monitoring to monitor catch sorting actions of crew members inside fish holding bins and investigating the use of video to monitor regulatory discards. An EFP for continued development of the capability to do video monitoring of rockfish catch in the GOA is currently under consideration by NMFS and Council (73 FR 14226, March 14, 2008). NMFS is hopeful that these investigations could lead to regulations that allow use of video monitoring to supplement observer coverage in some fisheries. Electronic monitoring technology is evolving rapidly, and it is probable that video and other technologies will be introduced to supplement current observer coverage and enhance data collection in some fisheries. Video monitoring has not been sufficiently tested to ensure compliance with a no discard requirement at this time, but NMFS would support and encourage research to explore the feasibility of video for this use.

In addition to the technical aspects of video monitoring, several other issues related to video must be resolved. These include the amount of staff time and resources that would be required to review video footage, curation and storage questions, and the costs to NMFS and the fishing industry. Until these issues are resolved, NMFS will continue to implement existing proven monitoring and catch estimation protocols. Electronic monitoring is discussed in more detail in section 10.5.7.4.

3.4.2.4 Development of the salmon excluder device

Gear modifications are one way to reduce salmon bycatch in the pollock fisheries. NMFS has issued exempted fishing permits for the purpose of testing a salmon excluder device in the pollock trawl fishery of the Bering Sea from 2004 to 2006 and for fall 2008 through spring 2010. The experiment would be conducted from Fall 2008 through Spring 2010. The successful development of a salmon excluder device for pollock trawl gear may result in reductions of salmon bycatch, potentially reducing costs associated with the harvest of pollock and reducing the potential impact on the salmon stocks.

3.4.3 Actions by Other Federal, State, and International Agencies

3.4.3.1 State salmon fishery management

ADF&G is responsible for managing commercial, subsistence, sport, and personal use salmon fisheries. The first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. Highest priority use is for subsistence under both State and Federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses. The Alaska Board of Fisheries (BOF) adopts regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users. Yukon River salmon fisheries management includes obligations under an international treaty with Canada. Subsistence fisheries management includes coordination with U.S. Federal government agencies where federal rules apply under ANILCA. Subsistence salmon fisheries are an important culturally and greatly contribute to local economies. Commercial fisheries are also an important contributor to many local communities as well as supporting the subsistence lifestyle. While specific aspects of salmon fishery management continue to be modified, it is reasonably foreseeable that the current State management of the salmon fisheries will continue into the future (Section 5.2.1).

3.4.3.2 Hatchery releases of salmon

Hatcheries produce salmon fry and release these small salmon into the ocean to grow and mature before returning as adults to the hatchery or local rivers and streams for harvest or breading. Hatchery production

increases the numbers of salmon in the ocean beyond what is produced by the natural system. A number of hatcheries produce salmon in Korea, Japan, Russia, the US, and Canada. Studies have suggested that efforts to increase salmon populations with hatcheries may have an impact on the body size of Pacific salmon (Holt et al 2008). The North Pacific Anadromous Fish Commission summarizes information on hatchery releases, by country and by area, where available. Chapter 5, Chinook Salmon, and Chapter 6, Chum Salmon, provide more information on current and past hatchery releases. It is reasonably foreseeable the hatchery production will continue at a similar level into the future.

3.4.3.3 Future exploration and development of offshore mineral resources

The Minerals Management Service (MMS) expects that reasonably foreseeable future activities include numerous discoveries that oil companies may begin to develop in the next 15-20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. In an EIS prepared for sales in the OCS Leasing Program, the MMS has assessed the cumulative impacts of such activities on fisheries and finds only small incremental increases in impacts for oil and gas development, which are unlikely to significantly impact fisheries and essential fish habitat (MMS 2003).

On April 8, 2008, MMS published a notice of intent to prepare an Environmental Impact Statement for oil and gas lease Sale 214 which is tentatively scheduled for 2011 in the "program area" of North Aleutian Basin, offshore the State of Alaska. The proposed action is to offer for lease all of the blocks in the program area. The EIS analysis will focus on the potential environmental effects of oil and gas exploration, development, and production on the fish, wildlife, socioeconomic, and subsistence resources in the North Aleutian Basin ''program area'' and neighboring communities.

The North Aleutian Basin underlies the northern coastal plain of the Alaska Peninsula and the waters of Bristol Bay and is believed to be gas-prone. The "program area" consists of approximately 2.3 million hectares (5.6 million acres) and extends offshore from about 10 statute miles to approximately 120 statute miles, in water depths from approximately 40 feet (12 meters) to 120 feet (37 meters). In October 1989, the North Aleutian Basin Planning Area was placed under a congressional moratorium which banned Department of Interior expenditures in support of any petroleum leasing or development activities in the planning area. In 1998, an Executive Order extended the moratorium as a Presidential withdrawal until 2012. In 2004, the congressional moratorium on petroleum-related activities in the North Aleutian Basin was discontinued and in 2007 the Presidential withdrawal was modified to exclude the North Aleutian Basin.

As part of the EIS process, MMS is collaborating with NMFS on a study of the North Pacific right whale in the North Aleutian Basin. The MMS also contracted to modify an ice-ocean circulation model for Alaska's Bristol Bay. Proposed studies for fiscal year 2008 include research on subsistence food harvest and sharing activities, studies of juvenile and maturing salmon, and nearshore mapping of juvenile salmon and settling crab. Additional studies are proposed for fiscal year 2009. Information on the Environmental Studies Program, completed studies, and a status report for continuing studies in the NAB area may be found at the Web site: http://www.mms.gov/alaska.

3.4.3.4 Expansion and construction of boat harbors by U. S. Army Corps of Engineers, Alaska District, Civil Works Division (COE-CW)

COE-CW funds harbor developments, constructs new harbors, and upgrades existing harbors to meet the demands of fishing communities. Several upgraded harbors have been completed to accommodate the growing needs of fishing communities and the off-season storage of vessels. Local storage reduces transit

times of participating vessels from other major ports, such as Seattle, Washington. Upgraded harbors include, King Cove, Dutch Harbor, Sand Point, Seward, Port Lions, Dillingham, and Kodiak. Additionally, new harbors are planned for Akutan, False Pass, Tatitlek, and Valdez.

3.4.3.5 Other State of Alaska actions

Several State actions in development may impact habitat and those animals that depend on the habitat. These potential actions will be tracked, but cannot be considered reasonably foreseeable future actions because the State has not proposed regulations. These actions include the following:

- Changes to the residue criteria under the Alaska Water Quality Standards. The State proposes to significantly generalize the language of the residues criterion and increase discretion in determining what constitutes an overage. The Alaska Department of Environmental Conservation's proposed residues criterion eliminates the prohibition on residues that cause leaching of toxic or deleterious substances. Under the new system, any and all residue discharges would be allowed without a permit, unless some type of harm (objectionable characteristics or presence of nuisance species) is discovered. The Environmental Protection Agency (EPA) has provided comments to the State regarding this proposed change and determined that major changes were needed for EPA approval. This proposed regulation change became effective for state purposes on July 30, 2006. The State expects EPA's approval of the State regulations by the end of 2008 (Nancy Sonafrank, Alaska Department of Environmental Quality, pers. comm., March 18, 2008).

- The State has passed legislation to implement State primacy for the National Pollution Discharge Elimination System Program under the Clean Water Act and has submitted a primacy package to EPA. The program is required to be as stringent as the current federal program but the effectiveness of implementation will be the key to whether impacts on habitat may be seen. The State expects to receive control of the program from EPA by the end of 2008 (Hartig 2008).

NMFS will track the progress of these potential actions and will include these in effects analyses in future NEPA documents when proposed rules are issued.

3.4.4 Private actions

3.4.4.1 Commercial pollock and salmon fishing

Fishermen will continue to fish for pollock, as authorized by NMFS, and salmon, as authorized by the State. Fishing constitutes the most important class of reasonably foreseeable future private actions and will take place indefinitely into the future. Chapter 4 Walleye Pollock and Chapter 10 Regulatory Impact Review, provide more information on the Bering Sea pollock fishery.

Commercial salmon fisheries exist throughout Alaska, in marine waters, bays, and rivers. Chapter 5 Chinook Salmon, Chapter 6 Chum Salmon, and Chapter 10 Regulatory Impact Review provide more information on the commercial salmon fisheries.

The Marine Stewardship Council (MSC) is a non-profit organization that seeks to promote the sustainability of fishery resources through a program of certifying fisheries that are well managed with respect to environmental impacts (http://eng.msc.org/). Certification conveys an advantage to industry in the marketplace, by making products more attractive to consumers who are sensitive to environmental concerns. A fishery must undergo a rigorous review of its environmental impact to achieve certification. Fisheries are evaluated with respect to the potential for overfishing or recovery of target stocks, the potential for the impacts on the "structure, productivity, function and diversity of the ecosystem," and the

extent to which fishery management respects laws and standards, and mandates "responsible and sustainable" use of the resource (SCS 2004). Once certified, fisheries are subject to ongoing monitoring, and other requirements for recertification.

The MSC has certified the BSAI and GOA pollock, BSAI Pacific cod freezer longline, halibut, and sablefish fisheries. The MSC has also certified the State of Alaska's management of all five salmon species. Because the program requires ongoing monitoring and re-evaluation for certification every five years (SCS 2004), and because the program may convey a marketing advantage, MSC certification may change the pollock industry incentive structure to increase sensitivity to environmental impacts.

3.4.4.2 CDQ Investments in western Alaska

The CDQ Program was designed to improve the social and economic conditions in western Alaska communities by facilitating their economic participation in the BSAI fisheries. The large-scale commercial fisheries of the BSAI developed in the eastern BS without significant participation from rural western Alaska communities. These fisheries are capital-intensive and require large investments in vessels, infrastructure, processing capacity, and specialized gear. The CDQ Program was developed to redistribute some of the BSAI fisheries' economic benefits to adjacent communities by allocating a portion of commercially important BSAI species to such communities as fixed shares, or quota, of groundfish, halibut, and crab. The percentage of each annual BSAI catch limit allocated to the CDQ Program varies by both species and management area. These allocations, in turn, provide an opportunity for residents of these communities to both participate in and benefit from the BSAI fisheries.

Sixty-five communities participate in the CDQ Program. These communities have formed six non-profit corporations (CDQ groups) to manage and administer the CDQ allocations, investments, and economic development projects. Annual CDQ allocations provide a revenue stream for CDQ groups through various channels, including the direct catch and sale of some species, leasing quota to various harvesting partners, and income from a variety of investments. The six CDQ groups had total revenues in 2005 of approximately $134 million, primarily from pollock royalties.

One of the most tangible direct benefits of the CDQ Program has been employment opportunities for western Alaska village residents. CDQ groups have had some successes in securing career track employment for many residents of qualifying communities, and have opened opportunities for non-CDQ Alaskan residents, as well. Jobs generated by the CDQ program included work aboard a wide range of fishing vessels, internships with the business partners or government agencies, employment at processing plants, and administrative positions.

Many of the jobs generated by the CDQ program are associated with shoreside fisheries development projects in CDQ communities. This includes a wide range of projects, including those directly related to commercial fishing. Examples of such projects include building or improving seafood processing facilities, purchasing ice machines, purchasing and building fishing vessel, gear improvements, and construction of docks or other fish handling infrastructure. CDQ groups also have invested in peripheral projects that directly or indirectly support commercial fishing for halibut, salmon, and other nearshore species. This includes seafood branding and marketing, quality control training, safety and survival training, construction and staffing of maintenance and repair facilities that are used by both fishermen and other community residents, and assistance with bulk fuel procurement and distribution. Several CDQ groups are actively involved in salmon assessment or enhancement projects, either independently or in collaboration with ADF&G. Salmon fishing is a key component of western Alaska fishing activities, both commercially and at a subsistence level. The CDQ Program provides a means to support and sustain both such activities.

3.4.4.3 Subsistence harvest of Chinook salmon

Communities in western and Interior Alaska depend on Chinook salmon from the Bering Sea for subsistence and the associated cultural and spiritual needs. Chinook salmon consumption can be an important part of regional diets, and Chinook salmon and Chinook salmon products are distributed as gifts or through barter and small cash exchanges to persons who do not directly participate in the subsistence fishery. Subsistence harvests will continue indefinitely into the future. Chapters 9 and 10 provide more information on subsistence harvests.

3.4.4.4 Sport fishing for Chinook salmon

Regional residents may harvest Chinook salmon for sport, using a State sport fishing license, and then use these salmon for essentially subsistence purposes. Regional sport fisheries, including Chinook salmon fisheries may also attract anglers from other places. Anglers who come to the action area from elsewhere to sport fish generate economic opportunities for local residents. Sport fishing for Chinook salmon will continue indefinitely into the future. Chapters 9 and 10 provide more information on sport harvests.

3.4.4.5 Increasing levels of economic activity in Alaska's waters and coastal zone

Alaska's population has grown by over 100,000 persons since 1990 (U.S. Census Bureau website accessed at http://www.census.gov/ on July 14, 2005). As of June 2005, Alaska's estimated population is about 662,000. The Alaska State Demographer's projection for the end of the forecast period of this analysis (2015) is about 734,000, an 11% increase (Williams 2005).

Alaska's population in its coastal regions is expected to continue to grow (Crossett et al. 2004). Population growth in these regions may have larger impacts on salmon stocks than growth in inland areas. So far, Alaska's total population growth in coastal areas remains low compared to that in other states. Alaska had the second largest percentage change in growth over the period from 1980 to 2002, but this% was calculated from a relatively low base. Its coastal population grew by about 63%. Alaska has the smallest coastal population density of all the states, with an average of 1.4 persons per square mile in 2003. By comparison, coastal densities were 641 persons per square mile in the northeastern states, 224 on the Atlantic southeastern states, 164 along the Gulf of Mexico, 299 along the West Coast exclusive of Alaska, and 238 in the Great Lakes states (including New York's Great Lakes counties). Maine and Georgia, the states with the next lowest coastal population density, had 60 persons per square mile (Crossett et al. 2004). Crossett et al. project continued population growth in Alaska's coastal regions; however growth in these areas will never approach the levels seen in Hawaii and the lower 48 states.

In Alaska, the success of the CDQ program and the expansion of such community based allocation programs in the future (as discussed under the earlier section on reasonably foreseeable rationalization programs) may lead to increased population in affected communities. A growing population will create a larger environmental "footprint," and increase the demand for marine environmental services. A larger population will be associated with more economic activity from increased cargo traffic from other states, more recreational traffic, potential development of lands along the margin of the marine waters, increased waste disposal requirements, and increased demand for sport fishing opportunities.

Shipping routes from Pacific Northwest ports to Asia run across the GOA and through the BSAI, and pass near or through important fishing areas. The key transportation route between West Coast ports in Washington, Oregon, and British Columbia to East Asia passes from the GOA into the EBS at Unimak Pass, and then returns to the Pacific Ocean in the area of Buldir Island. An estimated 3,100 large vessels used this route in the year ending September 30, 2006. An estimated 853 of these were bulk carriers, and an estimated 916 were container ships (Nuka Research 2006, page 12). The direct routes from California ports to East Asia pass just south of the Aleutian Islands. Continued globalization, growth of the Chinese

economy, and associated growth in other parts of the Far East may lead to increasing volumes of commercial cargo vessel traffic through Alaska waters. U.S. agricultural exports to China, for example, doubled between 2002, and 2004; 41% of the increase, by value, was in soybeans and 13% was in wheat (USDA 2005). In future years, this may be an important route for Canadian oil exports to China (Zweig and Jianhai 2005).

The significance of this traffic for the regional environment and for fisheries is highlighted by recent shipping accidents, including the December 2004 grounding of the *M/V Selendang Ayu* and the July 2006 incapacitation of the *M/V Cougar Ace*. The *M/V Selendang Ayu* dumped the vessel's cargo of soybeans and as much as 320,000 gallons of bunker oil, on the shores of Unalaska Island (USCG, Selendang Ayu grounding Unified Command press release, April 23, 2005). On July 23, 2006, the *M/V Cougar Ace*, a 654-foot car carrier homeported in Singapore, contacted the US Coast Guard and reported that their vessel was listing at 80 degrees and taking on water. The *M/V Cougar Ace* was towed to Dutch Harbor where the listing problem was corrected. The vessel was then towed to Portland, Oregon (Alaska Department of Conservation Final situation report, September 1, 2006, available at: http://www.dec.state.ak.us/spar/perp/response/sum_fy07/060728201/sitreps/060728201_sr_10.pdf).

Mining activities in Alaska are expected to increase in the coming years. The Red Dog mine in Northwest Alaska will continue operations and a new deposit in the Bristol Bay region is being explored for possible large-scale strip mining. The continued development and/or expansion of mines, though expected, will be dependent on stable metals prices in the coming years. At present it appears such prices will be stable.

In southwest Alaska copper, gold, and molybdenum may be mined at the prospective Pebble mine (www.pebblepartnership.com). The Pebble mine would be situated in the Bristol Bay region near the northeast end of Iliamna Lake, which feeds directly into Bristol Bay. The Pebble mine is at the pre-feasibility and pre-permitting stage of development, and faces a lengthy and rigorous timeline to production. The Pebble Partnership's proposed mine development plan will be subject to a regulatory review involving 11 state and federal agencies. The Pebble Partnership must provide the required information for an Environmental Impact Statement and be issued more than 60 State and Federal permits. The combined review and permitting process could take three years or more to complete.

Also in southwestern Alaska, near the Kuskokwim River, is the Donlin Creek gold mining project, which is currently completing its feasibility study, and is in preparation for beginning the permitting process. The land is owned by the Kuskokwim Corporation, and the subsurface rights are owned by the Calista Corporation, both Native corporations formed under the Alaska Native Claims Settlement Act. Donlin Creek is one of the largest undeveloped gold deposits in the world.

Oil and gas development can also be expected to increase due to the currently high oil and gasoline prices. Plans are underway for development of a gas pipeline that may include a shipping segment through the GOA. Exploration and eventual extraction development of the Arctic National Wildlife Preserve is also anticipated. It is also possible that fuel prices may create incentive for oil and gas lease sales on the continental shelf off western Alaska, which is the prime fishing ground of the EBS.

It is possible that hydrokinetic power will be generated on WAK rivers within the next ten years. The Federal Energy Regulatory Commission has issued 12 preliminary permits for in-river turbines on Alaskan mainstem rivers. One very small project operated for 60 days on the Yukon River at Ruby last year, and one larger project is likely to be installed at Eagle this year. NMFS statutory authorities require alternative energy permitting and licensing agencies to consult with NMFS regarding the impacts of proposed ocean energy projects on ocean and anadromous resources. FPA also grants NMFS the authority to prescribe fishways and to propose conservation measures to address any adverse effects to fish and

wildlife resources at projects licensed by FERC. These consultations offer the opportunity to provide recommendations to both the permitting agencies and energy companies on how to avoid, minimize, or mitigate the impacts of their energy projects on living marine resources and essential habitat. Therefore, NMFS will be aware and review any future studies on the impacts of the hydrokinetic turbines. Additionally, NMFS is reviewing a proposal for ocean kinetic energy generation near Teller-Brevig Mission. The NMFS Alaska Region web page provides more information at [http://www.nmfs.noaa.gov/habitat/habitatprotection/oceanrenewableenergy/index2.html] (Sue Walker, Hydropower Coordinator, NMFS Alaska Region, personal communication)

Additional references

Holt, C., M. Rutherford, R. Peterman. 2008. International cooperation among nation-states of the North Pacific Ocean on the problem of competition among salmon for a common pool of prey resources. Marine Policy 32. pp. 607-617.

IPCC. International Panel on Climate Change. Climate Change 2007, The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC.

Welch, D.W., Y. Ishida, and K. Nagasawa. 1998. Thermal limits and ocean migrations of sockeye salmon (Oncorhynchus nerka): long-term consequences of global warming. Can. J. Fish. Aquat. Sci. 55:937-948.

Appendix 3 – Revised Section 4.4 Consideration of future action (pollock)

4.3 Consideration of future actions

CEQ regulations require that the analysis of environmental consequences include a discussion of the action's impacts in the context of all other activities (human and natural) that are occurring in the affected environment and impacting the resources being affected by the proposed action and alternatives. This cumulative impact discussion should include incremental impacts of the action when added to past, present, and reasonably foreseeable future actions. Past and present actions affecting the pollock resource have been incorporated into the impacts analysis in this Chapter. Section 3.4 provides a detailed discussion of reasonably foreseeable future actions that may affect the Bering Sea pollock fishery, the Chinook salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on other resource components analyzed in the EIS.

4.3.1 Ecosystem-sensitive management

Measures to minimize chum salmon bycatch

The reasonable foreseeable future actions that will most impact the pollock fisheries and pollock stocks are changes to the management of the fisheries due to increasing protection of ESA-listed and other non-target species. The Council is considering action on management measure to minimize chum salmon bycatch in the pollock fishery. A suite of alternative management measures was proposed in April 2008, and a discussion paper was presented to the Council in October 2008. In December 2008, the Council developed a range of alternatives for analysis. Because any revised chum salmon bycatch measures will also regulate the pollock fishery, there will be a synergistic interaction between the alternatives proposed in this EIS and those considered under the chum salmon action. Analysis has not yet begun on the chum salmon action, but will be underway before this EIS is finalized, and a further discussion of the impact interactions will be included at that time.

Adjusting protections for Steller sea lions

The Council and NMFS may develop additional Steller sea lion protection measures to reduce the pollock fisheries interaction with Steller sea lions. As discussed in section 3.4, NMFS is currently developing a biological opinion on the status quo groundfish fisheries in the BSAI and GOA which is expected to be available in late 2009. Depending on the results of that biological opinion, the Council and NMFS may decide to change the management of the pollock fleet. Additionally, the potential change in listing for the ice seals and northern fur seals could result in management changes. As with new chum salmon measures, analysis of any new management measures for the pollock fleet would consider the impacts of adding those new measures to the existing suite of management measure for the pollock fleet.

Changes to fishery management based on ongoing research and understanding of ecosystem interactions and the effects of climate change

Pollock stocks may also be affected by changing climate conditions. Pollock distribution has been shown to be affected by bottom temperatures, with densities occurring in areas where the bottom temperatures are greater than zero (Ianelli et al., 2008). A study is currently underway linking temperature and salmon bycatch rates, and preliminary evidence indicates a relationship (Ianelli et al. 2009). At this time, it is not possible to forecast in what way changing climate conditions are likely to affect pollock stocks.

4.3.2 Traditional management tools

Development of the salmon excluder device

The development and deployment of the salmon excluder devise may reduce Chinook salmon bycatch and improve the fleets ability to harvest the pollock TAC under a hard cap. The salmon excluder is still being tested in pollock fisheries, and is not yet in wide-scale use, however many of the early design flaws have been corrected at this stage.

Authorization of the pollock fishery in future years

Future harvest specifications will primarily affect fishing mortality as the other significance criteria for pollock (temporal and spatial harvest, prey availability, and habitat suitability) are primarily controlled through regulations in 50 CFR part 679. The setting of harvest levels each year is controlled to ensure the stock can produced MSY on a continuing basis and to prevent overfishing. Each year's setting of harvest specifications include the consideration of past harvests and future harvests based on available biomass estimates. In-season managers close fisheries to directed fishing as fishermen approach TACs, treat species whose TACs have been taken as prohibited species, and introduce fishing restrictions, or actual fishery closures, in fisheries in which harvests approach OFL. The 2 million mt OY in the BSAI also contributes significantly to preventing overharvests. The controls on fishing mortality in setting harvest specifications ensure the stocks are able to produce MSY on a continuing basis.

Increasing enforcement responsibilities

The number of TAC categories with low values of ABC/OFL are increasing which tends to increase the likelihood that closures of directed fisheries to prevent overfishing will occur. In recent years management of species groups has tended to separate the constituent species into individual ABCs and OFLs. For example, in 1991 the category 'other red rockfish' consisted of four species of rockfish. By 2007, one of those species (sharpchin rockfish) had been moved to the 'other rockfish' category and northern, shortraker, and rougheye are now managed as separate species. While managing the species with separate ABCs and OFLs reduces the potential for overfishing the individual species, the effect of creating more species categories can increase the potential for incurring management measures to prevent overfishing, such as fishery closures. Managers closely watch species with fairly close amounts between the OFL and ABCs during the fishing year and the fleet will adjust behavior to prevent incurring management actions. Currently the NPFMC is considering separating components of the 'other species' category (sharks, skates, octopus, sculpin). Should that occur, incidental catch of sharks for example could impact management of the pollock fishery. As part of the 2006 'other species' incidental catch of 1,973 mt in the pollock fishery, 504 mt were shark. The tier 6 ABC for shark as part of the 'other species' category in 2006 was 463 mt and OFL 617 mt. If sharks were managed as a separate species group under their current tier, the pollock fishery would likely have been constrained in 2006.

Improved enforcement through VMS

The entire pollock fleet now carries VMS due to VMS requirements introduced in connection with the AFA. In-season managers currently use VMS intensively to manage fisheries so that harvests are as close to TACs as possible. VMS has also become a valuable diagnostic tool for addressing situations with unexpected harvests. It was used as a diagnostic tool in July 2006 to investigate the sources of a sudden and unexpected bycatch of squid in the pollock fishery. As agency experience with VMS grows, it should allow in-season managers to more precisely match harvests to TACs, reducing potential overages, and maximizing the value of TACs to industry.

4.3.3 Actions by Other Federal, State, and International Agencies

Future exploration and development of offshore mineral resources

The Minerals Management Service (MMS) expects that reasonably foreseeable future activities include development of oil and gas deposits over the next 15-20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. The MMS has published a notice of intent to prepare an Environmental Impact Statement for oil and gas lease Sale 214 which is tentatively scheduled for 2011 in the "program area" of North Aleutian Basin, offshore the State of Alaska. A notable proportion of the pollock fishery occurs in the North Aleutian Basin program area, and adverse environmental impacts resulting from exploration and development in the future could impact pollock stocks. The extent to which these impacts may occur is unknown.

4.3.4 Private actions

Commercial pollock fishing

The analysis assumes that the commercial fishery for pollock will continue into the future, and the direct effects analysis has been designed to study the impacts of the fishery.

Additional references

Ianelli, J., J. Gauvin, D. Stram, and P. Stabeno. 2009. Opportunistic temperature-at-depth recorders on Bering Sea pollock trawls to evaluate linkages between location-specific temperatures and pollock, salmon, and other species. Paper presented at the Alaska Marine Science Symposium. January 2009. Anchorage, Alaska.

Ianelli, J.N., S. Barbeaux, T. Honkalehto, S. Kotwicki, K. Aydin, and N. Williamson. 2008. Eastern Bering Sea Walleye Pollock. In, Stock Assessment and Fishery Evaluation (SAFE) report for the Bering Sea and Aleutian Islands groundfish. North Pacific Fishery Management Council, 605 West 4th Avenue, Anchorage, AK.

Appendix 4 – Revised Section 5.3.1.1 Pollock fishery bycatch of Chinook by sector

5.3.1.1 Pollock fishery bycatch of Chinook by sector

Bycatch of Chinook varies seasonally by season and by sector (Fig. 5-36 and Fig. 5-37; Table 5-22). Since 2002 the inshore CV fleet has consistently had the highest bycatch by sector in the A season, but prior to that offshore catcher processor catch was higher on a seasonal basis (Fig. 5-36). Catch by the mothership sector in the A season has always been lower than the other two sectors. Mean Chinook rates (number per 1,000 t of pollock) were presented for summary purposes and shows higher rates during the A-season compared to the B season except for 2005 where the average rates in both seasons were similar (though varied by sector; bottom panel of Table 5-22).

In the B season the inshore CV fleet has had the highest bycatch by sector since 1996 (except for 2001), followed by the offshore CP fleet (Fig. 5-37). As with the A season, historically the mothership fleet sector catch compared to the total has been low.

In recent years, rates for the inshore catcher vessel fleet have been consistently higher than for the other fleets (Fig. 5-38). To illustrate the relative difference between sectors, Table 5-23 shows the contrast of bycatch sector-specific patterns within aggregate season and annual mean levels. This shows a fair degree of inter-annual variability in the relative rates by sectors. The total catch for the mothership fleet was lower than the CP fleet in 2006, their relative rate was higher (Fig. 5-38). In the B season, the inshore fleet has the highest bycatch rates followed consistently in almost all years by the mothership fleet (Fig. 5-39).

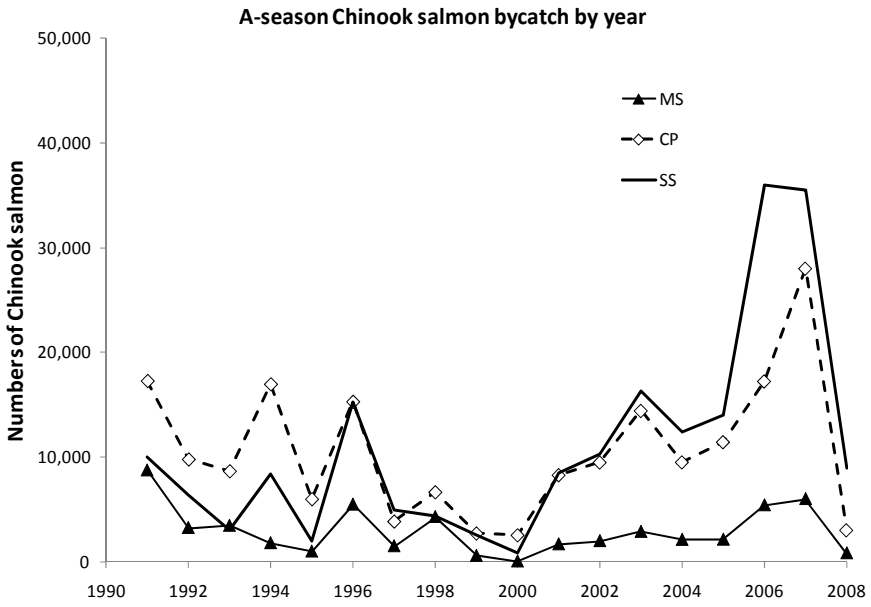

Fig. 5-36 Chinook salmon catch by sector in pollock fishery A season 1991-2008. Data are shown by inshore catcher vessel sector (solid line), offshore catcher processor (dotted line with diamonds) and mothership sector (solid line with triangles).

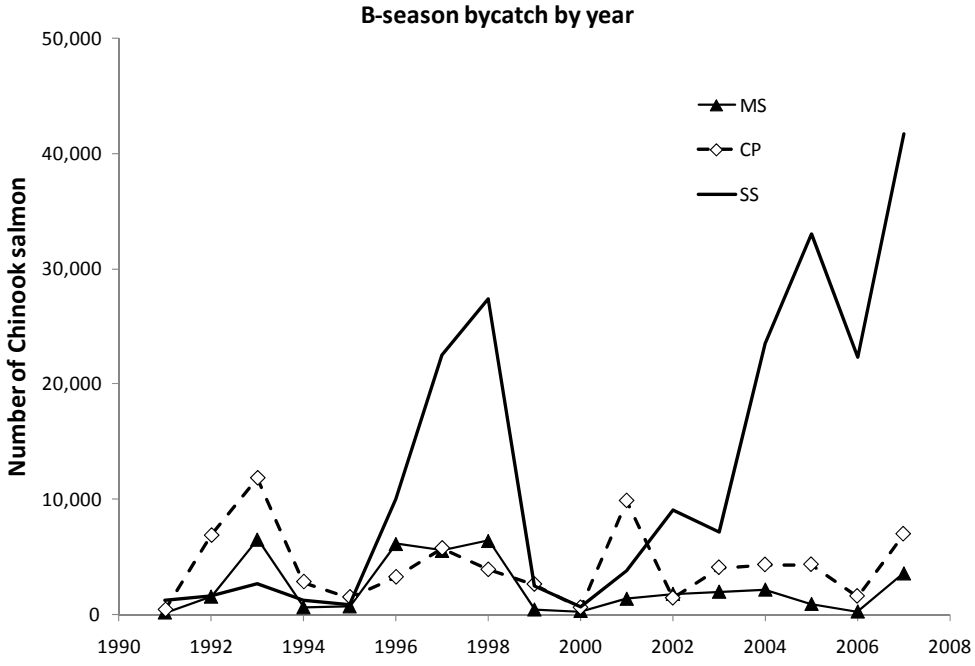

Fig. 5-37 Chinook salmon catch by sector in pollock fishery B season 1991-2007. Data are shown by inshore catcher vessel sector (solid line), offshore catcher processor (dotted line with diamonds) and mothership sector (solid line with triangles).

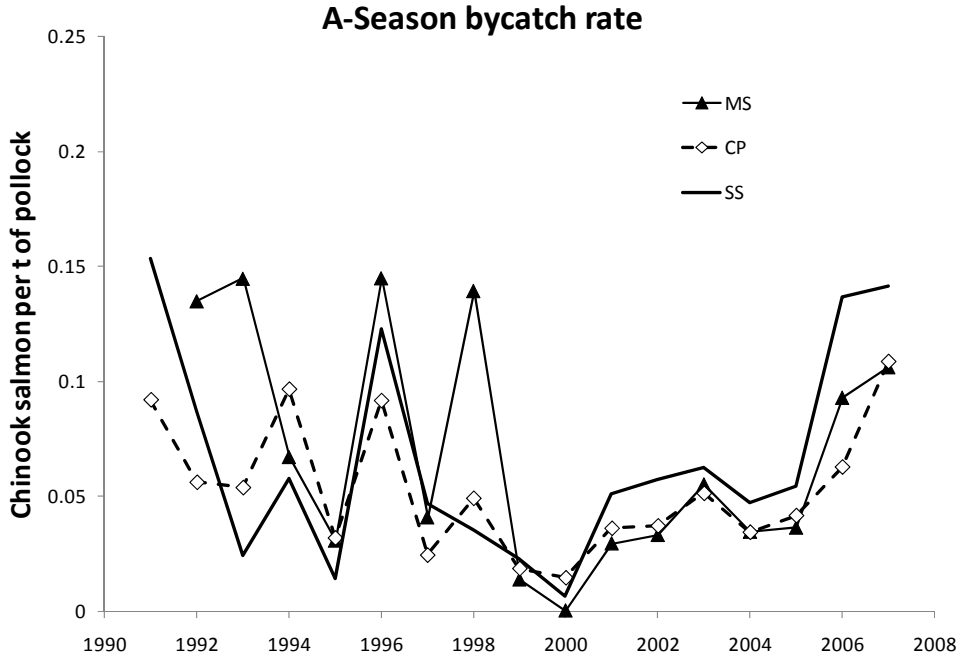

Fig. 5-38 Chinook salmon A season bycatch rates by sector (Chinook per t pollock). Inshore catcher vessel (solid line), offshore catcher processor (dashed line with diamonds) and mothership sector (solid line with filled triangles), 1991-2007.

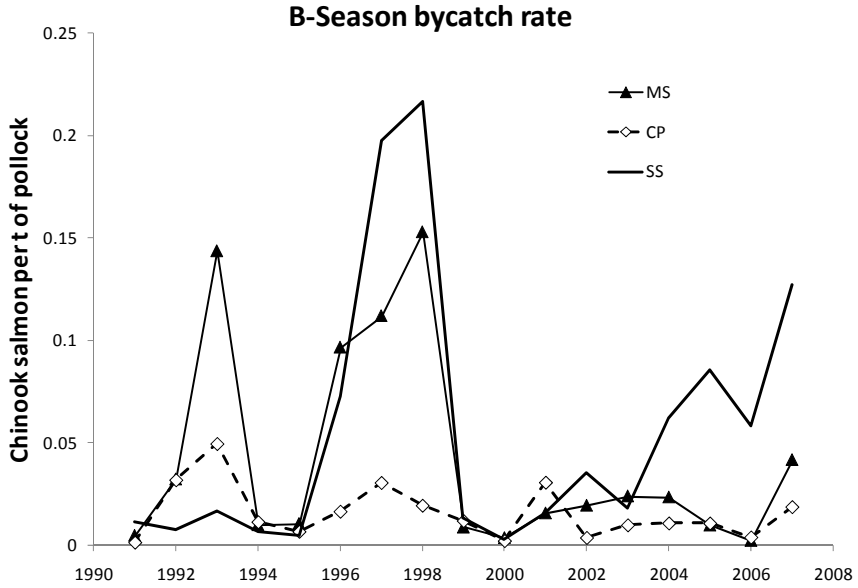

Fig. 5-39 Chinook salmon B season bycatch rates by sector (Chinook per t pollock). Inshore catcher vessel (solid line), offshore catcher processor (dashed line with diamonds) and mothership sector (solid line with filled triangles), 1991-2007.

Table 5-22 Catch of pollock and Chinook salmon along with Chinook rate (per 1,000 t of pollock) by sector and season, 2003-2007. Catches from CDQ are included. M=Mothership sector, P=catcher processor sector, and S=shoreside catcher-vessel sector.

Pollock (t)

Season	Sector	Year 2003	2004	2005	2006	2007
A	M	51,811	60,222	57,802	58,134	56,526
	P	280,505	275,625	273,977	274,279	257,647
	S	260,212	262,570	259,002	262,997	250,726
A	Sub-total	592,528	598,417	590,780	595,410	564,899
B	M	80,817	90,736	89,225	89,303	84,978
	P	413,512	401,570	403,537	405,586	372,737
	S	393,550	378,855	386,473	381,981	327,962
B	Sub-total	887,879	871,160	879,236	876,870	785,677
	Annual Total	1,480,408	1,469,577	1,470,016	1,472,280	1,350,576

Chinook bycatch

	Sector	Year 2003	2004	2005	2006	2007
A	M	2,892	2,092	2,111	5,408	5,860
	P	14,428	9,492	11,421	17,306	27,943
	S	16,488	12,376	14,097	36,039	35,458
A	Sub-total	33,808	23,961	27,630	58,753	69,261
B	M	1,940	2,076	888	200	3,544
	P	4,044	4,289	4,343	1,551	7,148
	S	7,202	23,701	34,986	22,654	41,751
B	Sub-total	13,185	30,067	40,217	24,405	52,443
	Annual Total	46,993	54,028	67,847	83,159	121,704

Chinook / 1,000 t of pollock

	Sector	Year 2003	2004	2005	2006	2007	Mean
A	M	56	35	37	93	104	65
	P	51	34	42	63	108	59
	S	63	47	54	137	141	88
A-season average		57	40	47	99	123	73
B	M	24	23	10	2	42	20
	P	10	11	11	4	19	11
	S	18	63	91	59	127	70
B-season average		15	35	46	28	67	37
	Average	32	37	46	56	90	52

Table 5-23 Sector and season specific bycatch rate (Chinook / t of pollock) relative to the mean value for the A and B seasons (first 6 rows) and for the entire year (last three rows), 2003-2007. M=Mothership sector, P=catcher processor sector, and S=shoreside catcher-vessel sector.

Season	Sector	Year 2003	2004	2005	2006	2007
A	M	98%	87%	78%	94%	85%
	P	90%	86%	89%	64%	88%
	S	111%	118%	116%	139%	115%
B	M	162%	66%	22%	8%	62%
	P	66%	31%	24%	14%	29%
	S	123%	181%	198%	213%	191%
A+B	M	115%	75%	44%	67%	74%
	P	84%	55%	50%	49%	62%
	S	114%	153%	165%	161%	148%

Appendix 5. Revised Table 5-3.

Table 5-3 Overview of Western Alaskan Chinook stock status 2008

Chinook Stock	Total run estimated?	2008 preliminary run estimate above or below projected/forecasted	Escapement estimates?	Escapement goals met?	Stock of concern?
Norton Sound	No	Below	Yes	No	Yield concern (since 2004)
Yukon	Yes	Below	Yes	Most in Alaska No-Canadian treaty goal	Yield concern (since 2000)
Kuskokwim	Yes	Below	Yes	Some [1]	No Yield concern discontinued 2007
Bristol Bay	Yes	Below	Yes	Some	No

[1] For the Kuskokwim: 3 of 4 weir goals were below while 3 of 5 aerial goals were below.

Appendix 6 – Revised Section 5.4 Consideration of future actions (Chinook salmon)

5.4 Considerations of future actions

CEQ regulations require that the analysis of environmental consequences include a discussion of the action's impacts in the context of all other activities (human and natural) that are occurring in the affected environment and impacting the resources being affected by the proposed action and alternatives. This cumulative impact discussion should include incremental impacts of the action when added to past, present, and reasonably foreseeable future actions. Past and present actions affecting the Chinook salmon resource have been incorporated into the impacts discussion above. Section 3.4 provides a detailed discussion of reasonably foreseeable future actions that may affect the Bering Sea pollock fishery, the salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on other resource components analyzed in the EIS.

5.4.1 Ecosystem-sensitive management

Measures to minimize chum salmon bycatch

The Council is considering action on management measure to minimize chum salmon bycatch in the Bering Sea pollock fishery. A suite of alternative management measures was proposed in April 2008, and a discussion paper was presented to the Council in October 2008. In December 2008, the Council developed a range of alternatives for analysis. Because any revised chum salmon bycatch measures will also regulate the pollock fishery, there will be a synergistic interaction between the alternatives proposed in this EIS and those considered under the chum salmon action. Analysis has not yet begun on the chum salmon action, but will be underway before this EIS is finalized, and a further discussion of the impact interactions will be included at that time. As with new chum salmon measures, analysis of any new management measures for the pollock fleet would consider the impacts of adding those new measures to the existing suite of management measure for the pollock fleet and analyzing those impacts on non-target species, such as Chinook salmon.

Changes to fishery management based on ongoing research and understanding of ecosystem interactions and the effects of climate change

Many efforts are underway to assess the relationship between oceanographic conditions, ocean mortality of salmon and their maturation timing to their respective rivers of origin for spawning (see Section 5.1). It is unclear whether the observed changes in salmon bycatch in recent years is due to fluctuations in salmon abundance, or whether there is a greater degree of co-occurrence between salmon and pollock stocks as a result of changing oceanographic conditions. Pollock distribution has been shown to be affected by bottom temperatures, with densities occurring in areas where the bottom temperatures are greater than zero (Ianelli et al. 2008). Specific ocean temperature preferences for salmon species are poorly understood. Regime shifts and consequent changes in climate patterns in the North Pacific ocean has been shown to correspond with changes in salmon production (Mantua et al 1997). Archival tags affixed to Asian chum salmon indicate that behavior and migration in juvenile, immature, and maturing fish are linked to temperature gradients (Friedland et al. 2001) and that immature chum exhibit a tendency to remain above the thermocline along the continental shelf (Azumaya et al. 2006). Anecdotal information suggests that Chinook and chum salmon prefer different (warmer) ocean water temperatures than adult pollock. A study linking temperature and salmon bycatch rates is underway and preliminary evidence indicates a relationship, even when factoring for month and area (Ianelli et al. 2009).

Compelling evidence from studies of changes in Bering Sea and Arctic climate, ocean conditions, sea ice cover, and permafrost and vegetation indicate that the area is experiencing warming trends in ocean temperatures and major declines in seasonal sea ice (IPCC, 2007; ACIA, 2005). Some evidence exists for a contraction of ocean habitats for salmon species under global warming scenarios (Welch et al. 1998). Studies in the Pacific northwest have found that juvenile survival is reduced when in-stream temperatures increase (Marine and Cech 2004, Crozier and Zabel 2006). A correlation between sea surface temperature and juvenile salmon survival rates in their early marine life has also been proposed (Mueter et al. 2002). The variability of salmon responses to climate changes is highly variable at small spatial scales, and among individual populations (Schindler et al 2008). This diversity among salmon populations means that the uncertainty in predicting biological responses of salmon to climate change remains large, and the specific impacts of changing climate on salmon cannot be assessed.

5.4.2 Traditional management tools

Development of the salmon excluder device

The development and deployment of the salmon excluder device may reduce Chinook salmon bycatch and improve the fleet's ability to harvest the pollock TAC under a hard cap. The salmon excluder is still being tested in pollock fisheries, and is not yet in wide-scale use, however many of the early design flaws have been corrected at this stage.

5.4.3 Actions by Other Federal, State, and International Agencies

State salmon fishery management

ADF&G is responsible for managing commercial, subsistence, sport, and personal use salmon fisheries. The first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. Highest priority use is for subsistence under both State and Federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses. The BOF adopts regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users. Yukon River salmon fisheries management includes obligations under an international treaty with Canada. Subsistence fisheries management includes coordination with U.S. Federal government agencies where federal rules apply under ANILCA. Subsistence salmon fisheries are an important culturally and greatly contribute to local economies. Commercial fisheries are also an important contributor to many local communities as well as supporting the subsistence lifestyle. While specific aspects of salmon fishery management continue to be modified, it is reasonably foreseeable that the current State management of the salmon fisheries will continue into the future.

Future exploration and development of offshore mineral resources

The Minerals Management Service (MMS) expects that reasonably foreseeable future activities include development of oil and gas deposits over the next 15-20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. The MMS has published a notice of intent to prepare an Environmental Impact Statement for oil and gas lease Sale 214 which is tentatively scheduled for 2011 in the "program area" of North Aleutian Basin, offshore the State of Alaska. Many of the western Alaska salmon migration corridors pass through the program area identified by MMS, and adverse environmental impacts resulting from exploration and development in the future could impact salmon stocks. The extent to which these impacts may occur is unknown.

Hatchery releases of salmon

The continued release of salmon fry into the ocean by domestic and foreign hatcheries is also expected to continue at similar levels. Hatchery production increases the numbers of salmon in the ocean beyond what is produced by the natural system, however some studies have suggested that efforts to increase salmon populations with hatcheries may have an impact on the body size of Pacific salmon (Holt et al 2008).

5.4.4 Private actions

Commercial pollock and salmon fishing (domestic and foreign), subsistence and sport fisheries for Chinook salmon

The reasonable foreseeable future actions that will most impact the western Alaska Chinook salmon stocks are the continuation of the management of the directed commercial, subsistence, and sport fisheries for Chinook salmon and changes to the management of the Bering Sea pollock fishery. For transboundary salmon stocks, bycatch may also be occurring in foreign fisheries, which may be impacting Alaskan salmon returns. Information is not available to assess the amount of bycatch caught in foreign fisheries, or the degree to which it is affecting Alaskan stocks. The analysis of direct effects assumes that these activities will continue at similar levels into the future.

Future exploration and development of onshore mineral resources

Salmon stocks may also be affected by onshore mining activities, to the extent that pollutants or contaminants from those operations may affect salmon spawning streams. Some instances of mining operations in southwestern Alaska are discussed in Section 3.4.

Hydrokinetic power generation

The Federal Energy Regulatory Commission has issued 12 preliminary permits for in-river turbines on Alaskan mainstem rivers. One very small project operated for 60 days on the Yukon River at Ruby last year, and one larger project is likely to be installed at Eagle this year. No studies have been completed yet on the impacts of hydrokinetic turbines on Chinook salmon, however this impact analysis will be conducted as part of the pilot licenses for these projects. Possible effects may be minor because these projects are designed to work in the highest current or flow areas of the river and fish generally avoid the high current areas. NMFS statutory authorities require alternative energy permitting and licensing agencies to consult with NMFS regarding the impacts of proposed ocean energy projects on ocean and anadromous resources. FPA also grants NMFS the authority to prescribe fishways and to propose conservation measures to address any adverse effects to fish and wildlife resources at projects licensed by FERC. These consultations offer the opportunity to provide recommendations to both the permitting agencies and energy companies on how to avoid, minimize, or mitigate the impacts of their energy projects on living marine resources and essential habitat. Therefore, NMFS will be aware and review any future studies on the impacts of the hydrokinetic turbines. Additionally, NMFS is reviewing a proposal for ocean kinetic energy generation near Teller-Brevig Mission. To date, no studies have been conducted on the impacts of ocean kinetic energy generation on Chinook salmon. The NMFS Alaska Region web page provides more information at [http://www.nmfs.noaa.gov/habitat/habitatprotection/oceanrenewableenergy/index2.html] (Sue Walker, Hydropower Coordinator, NMFS Alaska Region, personal communication)

References

Arctic Climate Impact Assessment [ACIA]. 2005. Cambridge University Press. 1,042 p. http://www.acia.uaf.edu

Azumaya, T., T. Nagasawa, O. Yamamura, M. Kawana, G. Khen, and O. Temnykh. 2006. Spatial Distributions of Chum Salmon and Environments of their Habitat in the Bering Sea during Summer and Autumn. NPAFC Technical Report No. 6.

Crozier, L., and R. Zabel. 2006. Climate impacts at multiple scales: evidence for differential populations responses in juvenile Chinook salmon. Journal of Animal Ecology 75. pp. 1100-1109.

Friedland, K.D., R.V. Walker, N.D. Davis, K.W. Myers, G.W. Boehlert, S. Urawa and Y. Ueno. 2001. Open-ocean orientation and return migration routes of chum salmon based on temperature data from data storage tags. Mar. Ecol. Prog. Ser. 216: 235-252.

Holt, C., M. Rutherford, R. Peterman. 2008. International cooperation among nation-states of the North Pacific Ocean on the problem of competition among salmon for a common pool of prey resources. Marine Policy 32. pp. 607-617.

Ianelli, J., J. Gauvin, D. Stram, and P. Stabeno. 2009. Opportunistic temperature-at-depth recorders on Bering Sea pollock trawls to evaluate linkages between location-specific temperatures and pollock, salmon, and other species. Paper presented at the Alaska Marine Science Symposium. January 2009. Anchorage, Alaska.

Ianelli, J.N., S. Barbeaux, T. Honkalehto, S. Kotwicki, K. Aydin, and N. Williamson. 2008. Eastern Bering Sea Walleye Pollock. In, Stock Assessment and Fishery Evaluation (SAFE) report for the Bering Sea and Aleutian Islands groundfish. North Pacific Fishery Management Council, 605 West 4th Avenue, Anchorage, AK.

Mantua, N., S. Hare, Y. Zhang, J. Wallace, and R. Francis. 1997. Bulletin of the American Meteorological Society. Vol. 78, no. 6. June 1997. pp. 1069-1079.

Marine, K. and J. Cech. 2004. Effects of high water temperature on growth, smoltification, and predator avoidance in juvenile Sacramento River Chinook Salmon. North American Journal of Fisheries Management 24. pp. 198-210.

Schindler, D., X. Augerot, E. Fleishman, N. Mantua, B. Riddell, M. Ruckelshaus, J. Seeb, and M. Webster. 2008. Fisheries, vol. 33, no. 10. October 2008. pp. 502-506.

Welch, D.W., Y. Ishida, and K. Nagasawa. 1998. Thermal limits and ocean migrations of sockeye salmon (Oncorhynchus nerka): long-term consequences of global warming. Can. J. Fish. Aquat. Sci. 55:937-948.

Appendix 7 – Revised Section 6.6 Consideration of future actions (chum)

6.6 Consideration of future actions

CEQ regulations require that the analysis of environmental consequences include a discussion of the action's impacts in the context of all other activities (human and natural) that are occurring in the affected environment and impacting the resources being affected by the proposed action and alternatives. This cumulative impact discussion should include incremental impacts of the action when added to past, present, and reasonably foreseeable future actions. Past and present actions affecting the chum salmon resource have been incorporated into the impacts discussion above. Section 3.4 provides a detailed discussion of reasonably foreseeable future actions that may affect the Bering Sea pollock fishery, the salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on other resource components analyzed in the EIS.

6.6.1 Ecosystem-sensitive management

Measures to minimize chum salmon bycatch

The Council is considering action on management measure to minimize chum salmon bycatch in the Bering Sea pollock fishery. A suite of alternative management measures was proposed in April 2008, and a discussion paper was presented to the Council in October 2008. In December 2008, the Council developed a range of alternatives for analysis. Because any revised chum salmon bycatch measures will also regulate the pollock fishery, there will be a synergistic interaction between the alternatives proposed in this EIS and those considered under the chum salmon action. Analysis has not yet begun on the chum salmon action, but will be underway before this EIS is finalized, and a further discussion of the impact interactions will be included at that time. As with new chum salmon measures, analysis of any new management measures for the pollock fleet would consider the impacts of adding those new measures to the existing suite of management measure for the pollock fleet and analyzing those impacts on non-target species, such as chum salmon.

Changes to fishery management based on ongoing research and understanding of ecosystem interactions and the effects of climate change

Many efforts are underway to assess the relationship between oceanographic conditions, ocean mortality of salmon and their maturation timing to their respective rivers of origin for spawning (see Section 5.1). It is unclear whether the observed changes in salmon bycatch in recent years is due to fluctuations in salmon abundance, or whether there is a greater degree of co-occurrence between salmon and pollock stocks as a result of changing oceanographic conditions. Pollock distribution has been shown to be affected by bottom temperatures, with densities occurring in areas where the bottom temperatures are greater than zero (Ianelli et al. 2008). Specific ocean temperature preferences for salmon species are poorly understood. Regime shifts and consequent changes in climate patterns in the North Pacific ocean has been shown to correspond with changes in salmon production (Mantua et al 1997). Archival tags affixed to Asian chum salmon indicate that behavior and migration in juvenile, immature, and maturing fish are linked to temperature gradients (Friedland et al. 2001) and that immature chum exhibit a tendency to remain above the thermocline along the continental shelf (Azumaya et al. 2006). Anecdotal information suggests that Chinook and chum salmon prefer different (warmer) ocean water temperatures than adult pollock. A study linking temperature and salmon bycatch rates is underway and preliminary evidence indicates a relationship, even when factoring for month and area (Ianelli et al. 2009).

Compelling evidence from studies of changes in Bering Sea and Arctic climate, ocean conditions, sea ice cover, and permafrost and vegetation indicate that the area is experiencing warming trends in ocean temperatures and major declines in seasonal sea ice (IPCC, 2007; ACIA, 2005). Some evidence exists for a contraction of ocean habitats for salmon species under global warming scenarios (Welch et al. 1998). Studies in the Pacific northwest have found that juvenile survival is reduced when in-stream temperatures increase (Marine and Cech 2004, Crozier and Zabel 2006). A correlation between sea surface temperature and juvenile salmon survival rates in their early marine life has also been proposed (Mueter et al. 2002). The variability of salmon responses to climate changes is highly variable at small spatial scales, and among individual populations (Schindler et al 2008). This diversity among salmon populations means that the uncertainty in predicting biological responses of salmon to climate change remains large, and the specific impacts of changing climate on salmon cannot be assessed.

6.6.2 Traditional management tools

Development of the salmon excluder device

The development and deployment of the salmon excluder device may reduce chum salmon bycatch. The salmon excluder is still being tested in pollock fisheries, and is not yet in wide-scale use, however many of the early design flaws have been corrected at this stage.

6.6.3 Actions by Other Federal, State, and International Agencies

State salmon fishery management

ADF&G is responsible for managing commercial, subsistence, sport, and personal use salmon fisheries. The first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. Highest priority use is for subsistence under both State and Federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses. The BOF adopts regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users. Subsistence fisheries management includes coordination with U.S. Federal government agencies where federal rules apply under ANILCA. Subsistence salmon fisheries are an important culturally and greatly contribute to local economies. Commercial fisheries are also an important contributor to many local communities as well as supporting the subsistence lifestyle. While specific aspects of salmon fishery management continue to be modified, it is reasonably foreseeable that the current State management of the salmon fisheries will continue into the future.

Future exploration and development of offshore mineral resources

The Minerals Management Service (MMS) expects that reasonably foreseeable future activities include development of oil and gas deposits over the next 15-20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. The MMS has published a notice of intent to prepare an Environmental Impact Statement for oil and gas lease Sale 214 which is tentatively scheduled for 2011 in the “program area” of North Aleutian Basin, offshore the State of Alaska. Many of the western Alaska salmon migration corridors pass through the program area identified by MMS, and adverse environmental impacts resulting from exploration and development in the future could impact salmon stocks. The extent to which these impacts may occur is unknown.

Hatchery releases of salmon

The continued release of salmon fry into the ocean by domestic and foreign hatcheries is also expected to continue at similar levels. Hatchery production increases the numbers of salmon in the ocean beyond what

is produced by the natural system, however some studies have suggested that efforts to increase salmon populations with hatcheries may have an impact on the body size of Pacific salmon (Holt et al 2008).

6.6.4 Private actions

Commercial pollock and salmon fishing (domestic and foreign), subsistence and sport fisheries for Chinook salmon

The reasonable foreseeable future actions that will most impact chum salmon stocks are the continuation of the management of the directed commercial, subsistence, and sport fisheries for chum salmon and changes to the management of the Bering Sea pollock fishery. The analysis of direct effects assumes that these activities will continue at similar levels into the future.

Future exploration and development of onshore mineral resources

Salmon stocks may also be affected by onshore mining activities, to the extent that pollutants or contaminants from those operations may affect salmon spawning streams. Some instances of mining operations in southwestern Alaska are discussed in Section 3.4.

References

Arctic Climate Impact Assessment [ACIA]. 2005. Cambridge University Press. 1,042 p. http://www.acia.uaf.edu

Azumaya, T., T. Nagasawa, O. Yamamura, M. Kawana, G. Khen, and O. Temnykh. 2006. Spatial Distributions of Chum Salmon and Environments of their Habitat in the Bering Sea during Summer and Autumn. NPAFC Technical Report No. 6.

Crozier, L., and R. Zabel. 2006. Climate impacts at multiple scales: evidence for differential populations responses in juvenile Chinook salmon. Journal of Animal Ecology 75. pp. 1100-1109.

Friedland, K.D., R.V. Walker, N.D. Davis, K.W. Myers, G.W. Boehlert, S. Urawa and Y. Ueno. 2001. Open-ocean orientation and return migration routes of chum salmon based on temperature data from data storage tags. Mar. Ecol. Prog. Ser. 216: 235-252.

Holt, C., M. Rutherford, R. Peterman. 2008. International cooperation among nation-states of the North Pacific Ocean on the problem of competition among salmon for a common pool of prey resources. Marine Policy 32. pp. 607-617.

Ianelli, J., J. Gauvin, D. Stram, and P. Stabeno. 2009. Opportunistic temperature-at-depth recorders on Bering Sea pollock trawls to evaluate linkages between location-specific temperatures and pollock, salmon, and other species. Paper presented at the Alaska Marine Science Symposium. January 2009. Anchorage, Alaska.

Ianelli, J.N., S. Barbeaux, T. Honkalehto, S. Kotwicki, K. Aydin, and N. Williamson. 2008. Eastern Bering Sea Walleye Pollock. In, Stock Assessment and Fishery Evaluation (SAFE) report for the Bering Sea and Aleutian Islands groundfish. North Pacific Fishery Management Council, 605 West 4th Avenue, Anchorage, AK.

Mantua, N., S. Hare, Y. Zhang, J. Wallace, and R. Francis. 1997. Bulletin of the American Meteorological Society. Vol. 78, no. 6. June 1997. pp. 1069-1079.

Marine, K. and J. Cech. 2004. Effects of high water temperature on growth, smoltification, and predator avoidance in juvenile Sacramento River Chinook Salmon. North American Journal of Fisheries Management 24. pp. 198-210.

Schindler, D., X. Augerot, E. Fleishman, N. Mantua, B. Riddell, M. Ruckelshaus, J. Seeb, and M. Webster. 2008. Fisheries, vol. 33, no. 10. October 2008. pp. 502-506.

Welch, D.W., Y. Ishida, and K. Nagasawa. 1998. Thermal limits and ocean migrations of sockeye salmon (Oncorhynchus nerka): long-term consequences of global warming. Can. J. Fish. Aquat. Sci. 55:937-948.

Appendix 8 – Revised Table ES-13 and Table 10-59

Table 10-59 Summary of escapement goals obtained, restrictions imposed and potential management changes with additional AEQ salmon to rivers over the time period 2003-2007.

River	Escapement met from 2003-2007	Additional restrictions imposed from 2003-2007			Likely management changes if additional AEQ salmon had been available 2003-2007
		Subsistence	Commercial	Sport	
Yukon	2006 some key goals not met	More conservative management plan imposed since 2001			2006-2007 additional fish would accrue towards meeting escapement; in all years increased potential for higher subsistence and commercial harvest
	2007 Treaty goal not met	2007 Canada	Below average 2005-2007	2007 Canada	
Kuskokwim	Most	More conservative management plan imposed 2001-2006			Potential for increased commercial harvests within market constraints
	2007 Most	No	No	No	
Bristol Bay (Nushagak)	2007 goals not met	No	No	2007	If sufficient additional to meet escapement then 2007 sport fish restriction would not have been imposed; In all years additional fish towards escapement, increased potential for higher subsistence and commercial harvest
Norton Sound subdistricts 5 and 6	2003-2006 Unalakleet goal not met	2003-2004; 2006-2007	2003-2007	2003-2004; 2006-2007	Additional fish would accrue to escapement

Appendix 9 – New subsistence section

Note: This section is still under development and more recent information may be provided by ADF&G. Any additional information will be incorporated into this section for the Final EIS.

Preliminary Draft section for the Final EIS on Potentially Affected Salmon Fisheries

This section first provides an overview of the management of the Chinook salmon fisheries in Alaska. Second, it provides an overview of the subsistence Chinook salmon fisheries in western and interior Alaska and a description of the subsistence fishery existing conditions by region. Third, it provides an overview of the Chinook commercial fisheries and a description of the commercial fishery existing conditions by region [not included in this version, from Chapter 10 of DEIS]. Fourth, it provides an overview of the personal use and sport Chinook salmon fishery and a description of the sport and personal use fishery by region [not included in this version, from Chapter 10 of DEIS].

1.1 Management of Chinook salmon fishing

The State of Alaska manages sport, commercial, personal use, and State subsistence harvest on lands and waters throughout Alaska. ADF&G is responsible for managing commercial, subsistence, sport, and personal use salmon fisheries. The first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. The highest priority use is for subsistence under both State and Federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses. The Alaska Board of Fisheries (BOF) adopts regulations through a public process to conserve and allocate fisheries resources to the various user groups. Yukon River salmon fisheries management includes obligations under an international treaty with Canada. Subsistence fisheries management includes coordination with U.S. government agencies where Federal rules apply under ANILCA. The Federal government manages subsistence uses on Federal lands and waters in Alaska, consistent with the subsistence priority for rural Alaska residents as provided by Title VIII of ANILCA.

1.1.1 State subsistence management

ADF&G, under the direction of the Alaska BOF, manages subsistence, personal use, and commercial Chinook salmon harvests on waters flowing in state lands. The State defines subsistence uses of wild resources as noncommercial, customary, and traditional uses for a variety of purposes. These include:

> Direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption (AS 16.05.940[33]).

Under Alaska's subsistence statute, the BOF must identify fish stocks that support subsistence fisheries and, if there is a harvestable surplus of these stocks, adopt regulations that provide reasonable opportunities for these subsistence uses to take place. Whenever it is necessary to restrict harvests, subsistence fisheries have a preference over other uses of the stock (AS 16.05.258). ADF&G, Division of Commercial Fisheries, manages the subsistence fisheries in the area of potential effect.

Alaska subsistence fishery regulations do not in general permit the sale of resources taken in a subsistence fishery. However, State law does recognize "customary trade" as a potential subsistence use. Alaska Statute defines customary trade as the limited noncommercial exchange, for minimal amounts of cash, as restricted by the appropriate board, of fish or game resources (AS 16.05.940(8)).

For more information on State management of the salmon subsistence fisheries, refer to the Alaska Subsistence Salmon Fisheries 2005 Annual Report, available on the State of Alaska website at: http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf**.** This is the most recent report available, published in December 2007 (ADF&G 2007). Subsequent sections of this EIS frequently summarize and incorporate by reference information from this report, when applicable, to focus the analysis on the key issues and eliminate repetitive information. Additional information and analysis on subsistence harvest in Alaska is available on the ADF&G Subsistence Division website.[2]

1.1.2 State management of personal use and sport salmon fisheries

Alaska Statue defines personal use fishing as the taking, fishing for, or possession of finfish, shellfish, or other fishery resources, by Alaska residents for personal use and not for sale or barter, with gill or dip net, seine, fish wheel, long line, or other means defined by the BOF (AS 16.05.940(25)). Personal use fisheries are different from subsistence fisheries because they either do not meet the criteria established by the Joint Board for identifying customary and traditional fisheries (5 AAC 99.010), or because they occur within nonsubsistence areas.

The Joint Board of Fisheries and Game is required to identify 'nonsubsistence areas', where 'dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life of the area or community." (AS 16.05.258(c)). The BOF may not authorize subsistence fisheries in nonsubsistence areas. Personal use fisheries provide opportunities for harvesting fish with gear other than rod and reel in nonsubsistence areas.[3,4]

Generally, fish may be taken for personal use purposes only under authority of a permit issued by ADF&G. Personal use fishing is primarily managed by ADF&G, Sport Fish Division, but some regional or area fisheries for various species of fish are managed by the Division of Commercial Fisheries. For more information on State management of the personal use fisheries, refer to the ADF&G website: http://www.adfg.state.ak.us/special/special_fisheries/personal_use.php.

The ADF&G Sport Fish Division also manages the state's sport (recreational) fisheries. Alaska statute defines sport fishing as the taking of or attempting to take for personal use, and not for sale or barter, any fresh water, marine, or anadromous fish by hook and line held in the hand, or by hook and line with the line attached to a pole or rod which is held in the hand or closely attended, or by other means defined by the Board of Fisheries (AS 16.05.940(30). By law, the Division's mission is to protect and improve the state's recreational fisheries resources. For more information on State management of recreational fisheries, refer to the ADF&G website: http://www.sf.adfg.state.ak.us/statewide/index.cfm.

Also per Alaska Statute (5 AAC 75.075(c)), the ADF&G Division of Sport Fish is responsible for overseeing the annual licensing of sport fish businesses and guides. A "sport fishing guide" means a

[2] http://www.subsistence.adfg.state.ak.us/geninfo/publctns/articles.cfm#SUBSISTENCE_2000
[3] Refer to Alaska Subsistence Salmon Fisheries 2005 Annual Report. (p. 1). www.subsistence .adfg.state.ak.us/TechPap/tp318.pdf
[4] The Joint Board has identified five nonsubsistence areas in (5 AAC 99.015): Ketchikan, Juneau, Anchorage-Matsu-Kenai, Fairbanks, and Valdez.

person who is licensed to provide sport fishing guide services to persons who are engaged in sport fishing (AS 16.40.299). "Sport fishing guide services" means assistance, for compensation or with the intent to receive compensation, to a sport fisherman to take or to attempt to take fish by accompanying or physically directing the sport fisherman in sport fishing activities during any part of a sport fishing trip. Salmon is one of the primary species targeted in the States' recreational fisheries, and most anglers sport fishing for anadromous (sea-run) Chinook (king) salmon must have purchased (and have in their possession) a current year's king salmon stamp. For further information, refer to the ADF&G website: http://www.sf.adfg.state.ak.us/Guides/index.cfm/FA/guides.home. This site contains information important to the State of Alaska, Department of Fish and Game requirements for sport fish charter businesses, sport fish guides, and saltwater charter vessels.

1.1.3 State Commercial Chinook salmon fishery management

Finally, commercial fisheries of Alaska fall under a mix of State and Federal management jurisdictions. In general, the State has management authority for all salmon, herring, and shellfish fisheries, and for groundfish fisheries within 3 nautical miles of shore. The Federal government has management authority for the majority of groundfish fisheries from 3 to 200 nautical miles off shore.

The State manages a large number of commercial salmon fisheries in waters from Southeast Alaska to the Bering Strait. Management of the commercial salmon fisheries is the responsibility of the ADF&G Commercial Fisheries Division, under the direction of the BOF, and are managed under a limited entry system. Participants need to hold a limited entry permit for a fishery in order to fish, and the number of permits for each fishery is limited. The State originally issued permits to persons with histories of participation in the various salmon fisheries. Permits can be bought and sold, thus new persons have entered since the original limitation program was implemented, by buying permits on the open market.

Like the sport, subsistence, and personal use fisheries managed by the State, Alaska's commercial salmon fisheries are administered through the use of management districts throughout the state. The value of the commercial salmon harvest varies both with the size of the runs and with foreign currency exchange rates. Average annual value of the 2000 – 2004 harvest was in excess of $230 million.[5] Because of the magnitude of commercial fisheries for salmon, state biologists collect extensive information and statistics for management decisions. For information on commercial regulations refer to: http://www.cf.adfg.state.ak.us/geninfo/regs/cf_regs.php.

1.1.4 Federal subsistence management

The Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, mandates that rural residents of Alaska be given a priority for subsistence uses of fish and wildlife. In 1986, Alaska passed a law mandating a rural subsistence priority to bring it into compliance with ANILCA. However, in 1989, the Alaska Supreme Court ruled that the rural priority in the state's subsistence law violated provisions of the Alaska Constitution. As a result, the Federal government manages subsistence uses on Federal public lands and waters in Alaska—about 230 million acres or 60% of the land within the state. To help carry out the responsibility for subsistence management, the Secretaries of the Interior and Agriculture established the Federal Subsistence Management Program (FSMP).

On July 1, 1990, the U.S. Departments of the Interior and of Agriculture assumed responsibility for implementation of Title VIII of ANILCA on public lands. The Departments administer Title VIII by

[5]http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmhome.php.

regulations in the Code of Federal Regulations. The Departments established a Federal Subsistence Board and 10 Regional Advisory Councils to administer the Federal Subsistence Management Program. The Federal Subsistence Board's composition includes a Chair appointed by the Secretary of the Interior with concurrence of the Secretary of Agriculture; the Alaska Regional Director, U.S. Fish and Wildlife Service; the Alaska Regional Director, National Park Service; the Alaska State Director, Bureau of Land Management; the Alaska Regional Director, Bureau of Indian Affairs; and the Alaska Regional Forester, USDA Forest Service.

Through the Federal Subsistence Board, these agencies participate in the development of regulations which establish the program structure, determine which Alaska residents are eligible to take specific species for subsistence uses, and establish seasons, harvest limits, and methods and means for subsistence take of species in specific areas. The Regional Advisory Councils provide recommendations and information to the Board; review proposed regulations, policies and management plans; and provide a public forum for subsistence issues. Each Council consists of residents representing subsistence, sport, and commercial fishing and hunting interests.

1.2 Importance of subsistence

This section provides a description of the importance of the subsistence to Native peoples of Alaska and other rural Alaska residents. As discussed in Chapter 5, analysis of the stock composition of Chinook salmon incidentally caught in the Bering Sea pollock fishery has shown that the stock structure is dominated by western Alaska stocks. Therefore, this section focuses on the importance of subsistence to people who live in western and interior Alaska.

Subsistence salmon fisheries are important nutritionally, culturally, as well as greatly contribute to local economies. Many researchers have described the importance of subsistence to individual Alaskan communities and households (Coffing 1991; Krieg et al. 2007; Moncrieff 2007; Magdanz et al. 2005; Walker and Coffing 1993; Walker et al. 1989; Wolfe 1987; Wolfe 2003; Wolfe 2007; Wolfe and Walker 1987). Alaska Native communities in the action area are historically subsistence societies. A relatively early report on findings from the Alaska Natives Commission (1994) devoted an entire volume to Alaska Native subsistence.[6] This report notes that during the past 250 years, much of the technology of Native subsistence has changed profoundly, as people often use more modern instruments of harvest, transportation, and storage. On the surface, then, today's subsistence activities may look very different from those prior to the mid-18th century, prior to the arrival of the first non-Natives. However, beneath the visible level, older patterns of behavior and values continue. The report states: "As we try to define what subsistence really is in contemporary Alaska, we must distinguish between form and function. How Native people practice it today has changed profoundly over the centuries, but what they are doing is mainly what they have always done. And what they have always done is very different from the economic organization and personal relationships of contemporary mass culture."

The most recent statewide summary of subsistence harvest and use in Alaska (modeled statewide summary) indicates that on average among rural residents of Alaska, 60% of all fish and wildlife resources harvested are fish, and that on average, 78% of households in the Arctic region harvest fish, while 96% of Arctic households use subsistence caught fish (Wolfe 2000). Similarly, 75% of households

[6]The Alaska Natives Commission (joint Federal-State Commission on Policies and Programs Affecting Alaska Natives) was created by Congress in 1990, to conduct a comprehensive study of the social and economic status of Alaska Natives and the effectiveness of the policies and programs of the U.S. and the State of Alaska that affect Alaska Natives (1994). See the UAA Justice Center link: http://justice.uaa.alaska.edu/rlinks/natives/ak_subsistence.html.

in the Interior region harvest fish and 92% of households use fish; while 98% of Yukon-Kuskokwim Delta households harvest fish and 100% use fish (Wolfe 2000).[7]

Subsistence salmon harvests in the Arctic-Yukon-Kuskokwim (AYK) region, for example, have cultural and practical significance to many of the approximately 120 communities, representing approximately 14,711 households and approximately 58,596 residents (in 2007) in the AYK region. In addition, more than 57,000 residents in the Fairbanks North Star and Denali Boroughs, many of whom also depend upon AYK salmon stocks for dietary and other cultural needs. There are also Canadian residents who rely on AYK salmon stocks. In Bristol Bay, 18 communities harvest Chinook salmon for subsistence. [8]

Subsistence foods in general are important components of regional diets. The Alaska Subsistence Salmon Fisheries 2005 Annual Report[9] states that of the estimated 43.7 million pounds of wild foods produced in rural Alaska communities annually, subsistence fisheries contribute about 60% from finfish and 2% from shellfish (Figure New-1). Although producing a major portion of the food supply, subsistence harvests represent a small part of the annual harvest of all wild resources in Alaska (about 2%). Commercial fisheries take 97% of the wild resource harvest, and sport fisheries and hunts take about 1%.

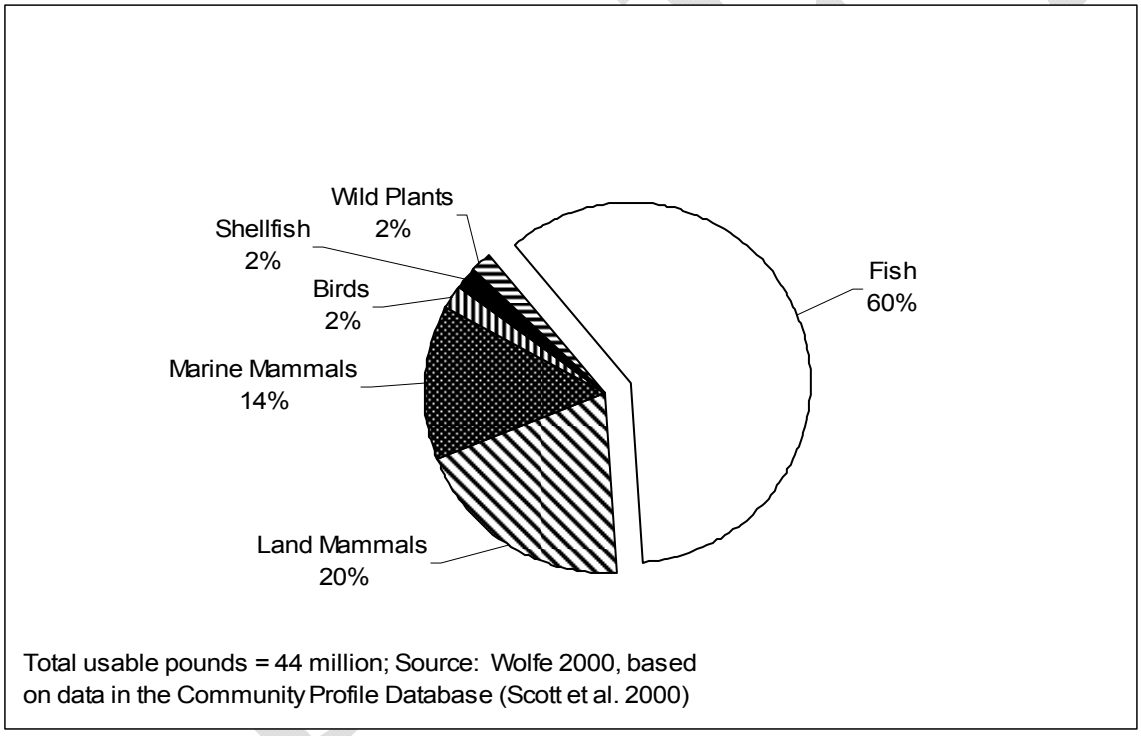

Fig. New -1 Composition of subsistence harvest by rural Alaska Residents

Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

Most rural Alaska communities today have mixed subsistence and market-based economies, in which subsistence harvests are a prominent part of the local economy and the mainstay of social welfare of the people (Wolfe and Walker 1987). In 'mixed' economies, small to moderate amounts of cash are provided at different times of the year by limited resources. Subsistence activities provide the material basis that

[7]Source: www.subsistence.adfg.state.ak.us/geninfo/publctns/articles.cfm#SUBSISTENCE_2000.
[8]Source: ADF&G Division of Subsistence, February 3, 2009.
[9]http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf. p. 7.

allows these emerging mixed subsistence and market-based economies[10] to continue. They also provide a context within which the traditional subsistence elements of these cultures can persist. Cultural practices in regional communities will vary between broad ethnic groupings and between smaller groups within these larger groupings. However, each of these subsistence communities was once organized completely around wild resource use, and these communities require access to these resources to support the personal relationships, and ways of thought, that emerged in those earlier times.

During the development of the EIS, many individuals wrote public comment letters to NMFS and testified to the Council on the importance of subsistence harvest to their livelihoods, family, tribe, culture, and community. Public comments received explained that salmon are especially significant to the cultural, spiritual, and nutritional needs of Alaska Native peoples, and that analysis of impacts on subsistence users and subsistence resources must reflect the values obtained from a broad range of uses, not simply the commercial value or monetary replacement costs of these fish. Comments emphasized that strong returns of healthy salmon are critical to the future human and wildlife uses of those fish and to the continuation of the subsistence way of life. These comments are part of the administrative record and are considered during decision making. Enabling the people potentially impacted by an action to explain how they are impacted, and the magnitude of the impacts, is a primary role of the public process. For example, public comment from the Bering Sea Elders Advisory Group (pp. 1 – 2) follows:

> *"Our subsistence practices and, specifically, ties to salmon go beyond commercial value or the monetary replacement cost of food. The English language term "subsistence" is not in our Yupik language and does not describe the totality of our ties to salmon.*
>
> *Traditionally, Alaska Native peoples derive their food, nutrition, ethics, and values of stewardship, languages, codes of conduct, stories, songs, dances, ceremonies, rites of passage, history, and sense of place and spirituality from the lands, waters, fish, and wildlife they have depended on for millennia. Many White persons imagine that subsistence is merely the act of an individual going hunting or fishing. Subsistence, in actual fact, is a complicated economic system and it demands the organized labor of practically every man, woman and child in a village. There are countless tasks, such as maintenance of equipment…, preparing the outfit for major hunting and fishing expeditions…dressing thousands of pounds of fish….sharing harvest of meat and fish with other communities.*

While the economic value of the subsistence harvest is significant, subsistence is clearly more than an economic system and cannot solely be measured by harvest levels; it is the social foundation for many rural and Native communities. The Alaska Natives Commission report (1994) referenced subsistence surveys in 98 communities, and emphasized that virtually all of the meat, fish, and poultry annually consumed in half of the surveyed communities came from the harvest of wild resources. The report states that if subsistence resources are denied to subsistence-dependent communities, the result would be the deterioration of nutrition, public health, and social stability, primarily because the cost of buying, transporting, and storing imported replacements would be impossible for local people to bear over time. The long-term consequence would be the gradual erosion and disappearance of many rural communities through out-migration. In this way, subsistence is tied to the survival of human communities and cultures. This point is also made in Wolfe (2007), which states that "Changes in the salmon fisheries, such as decreases in subsistence and commercial harvests can have broad impacts on the local ways of life, including traditional cultures, local economies, personal identities, and societies."

Subsistence activities commonly involve an entire community. According to Wolfe (2007), "in the AYK region, salmon is harvested primarily within family groups…[c]ommonly men harvest and women

[10] The term is from Wolfe and Walker, 1987.

process salmon for subsistence food, consumed within extended families and shared with others in the community." Subsistence Chinook salmon may be consumed directly by the person or family that harvests it, or may be distributed to other persons in the community. Many studies indicate that the traditional wide-scale sharing of subsistence products is a central activity that unifies extended families and communities. With reduced subsistence opportunities come fewer opportunities for young people to learn cultural subsistence practices and techniques, and this knowledge may be lost to them in the future. Wolfe (2007) provides more information on the relationship between salmon and culture in the AYK region.

Subsistence communities also appear to specialize by household, with a relatively small percentage (which researchers have called 'super-households') being extremely productive, harvesting most of their community's annual supplies and distributing them to less productive families. In western Alaska, entire families migrate seasonally to summer fishcamps. These annual migrations, and fishcamp life itself, are important elements of rural and cultural life. [11]

Extensive non-market sharing and exchange take place in communities with mixed subsistence economies. Through sharing, local communities' values are expressed and transmitted across generations. Salmon may be given or shared with other persons without the expectation that something specific will be given in exchange. Fish may be shared with family members or friends, in the region or outside of it. An example from the Tanana: "…salmon is given to individual elders, elders' residences and people who do not have access or ability to fish. Almost all the fishermen interviewed stated that the first salmon caught were given away to share the taste of the first fish and bring luck to the fishermen." (Moncrieff, 2007)

Chinook salmon may also be exchanged for other goods. Trade of subsistence goods between communities has a long history in regional Native cultures. As Russians came into increasing contact with Natives on the Asian side of the Bering Straits several centuries ago, there was increasing trade in western manufactured goods and products, and increasing use of monetary sales as goods were exchanged. These processes continue today. An example from Holy Cross notes that Yukon River Chinook: "…is traded for a variety of items. Some people bring salmon or moose when they travel and give it as a gift to the family they stay with. One participant traded fish for pizza from another village: one pizza for one Chinook salmon, each valued at about $12. Others traded their salmon for Kuskokwim River fish, berries from the stores in Anchorage, berries from the other areas, or crafts or services. Trade relationships, active in the precontact era, continue to exist today." (Moncrieff, 2007)

Given the significance of the subsistence harvest in rural Alaska, subsistence use should also be viewed as having substantial economic value. Food costs and living expenses are high in rural Alaska. Materials have to be transported long distances with limited transportation and distribution infrastructures, consequently, these services are expensive. Small populations may not be able to support returns to scale in transportation, distribution, or storage, or support the large numbers of firms that would provide for competitive markets. The Cooperative Extension Service of the University of Alaska Fairbanks routinely surveys communities to gather information on living costs. In December 2007, it found that it cost 189% more to purchase a week of food in Bethel than in Anchorage. Food costs in other communities in the action area were also higher than in Anchorage. Compared to Anchorage, costs in Kotzebue were 208% higher, costs in Naknek/King Salmon were 218% higher, and costs in Nome were 171% higher (UAF 2007).

[11]Wolfe, Robert J. 1987. "The super-household: specialization in subsistence economies". Paper presented at the 14th Annual Meeting of the Alaska Anthropological Association. March 12-13. Anchorage, Alaska.

It is also important to understand that subsistence harvesting activity is not without cost, and that often a household's subsistence use is 'capitalized' by its cash income, since the efficient harvest of large amounts of fish cannot be accomplished without goods such as fishnets, motors, fuel, etc. So while many view the subsistence and cash economies as inversely related, subsistence is its own economic sector, highly significant to those who practice it, and fully co-existing with cash-market activities. Subsistence salmon harvesters often use the same or similar types of set and/or drift gillnets, boats, and other equipment as commercial harvesters. Some subsistence harvesters also participate in commercial salmon fisheries, and they depend on income earned in the commercial fisheries to help offset the costs, both of acquiring equipment and of operating it, associated with subsistence salmon fishing. While it appears that sufficient opportunities for subsistence harvests have occurred in most areas in recent years, reductions in the commercial harvest may greatly affect the subsistence fishery, to the extent some households use commercial catch to offset costs incurred in the subsistence fishery. Wolfe (2003) provides a more complete discussion of the commercial and subsistence relationships.[12]

12 Wolfe, Robert J. 2003. People and Salmon of the Arctic, Yukon, and Kuskokwim. Socioeconomic Dimensions: Fishery Harvests, Culture Change, and Local Knowledge Systems. Paper presented to the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative Workshop, Anchorage, November 18-20, 2003, 35 pp.

1.2.1 Discussions by Region

The vast majority of the information in this section is from the Alaska Subsistence Salmon Fisheries 2005 Annual Report (ADF&G 2007), as cited previously, unless otherwise noted. When available, more recent information on subsistence harvests is provided. Chapter 5 contains the status of the Chinook salmon stocks through 2008. Additional recent information was provided through public comment on the DEIS and is incorporated in the following sections.

1.2.1.1 Overview of Regional Subsistence Harvests

The amount of Chinook salmon harvested for subsistence use and the portion of subsistence Chinook salmon harvested relative to other species of salmon varies greatly by region (Figure New-2, Figure New-3). Figure New-2 reports subsistence Chinook harvests in 2005 (155,658 Chinook) by general harvest area. The largest estimated subsistence harvests of Chinook salmon in 2005 occurred in the Kuskokwim area (74,354 salmon; 48%), followed by Yukon (53,547 salmon; 34%), Bristol Bay (15,212 salmon; 10%), Northwest (4,239 salmon; 3%), the Glennallen Subdistrict of the Prince William Sound Area (2,785 salmon; 2%), and the Chitina Subdistrict of the Prince William Sound Area (2,182 salmon; 1%).

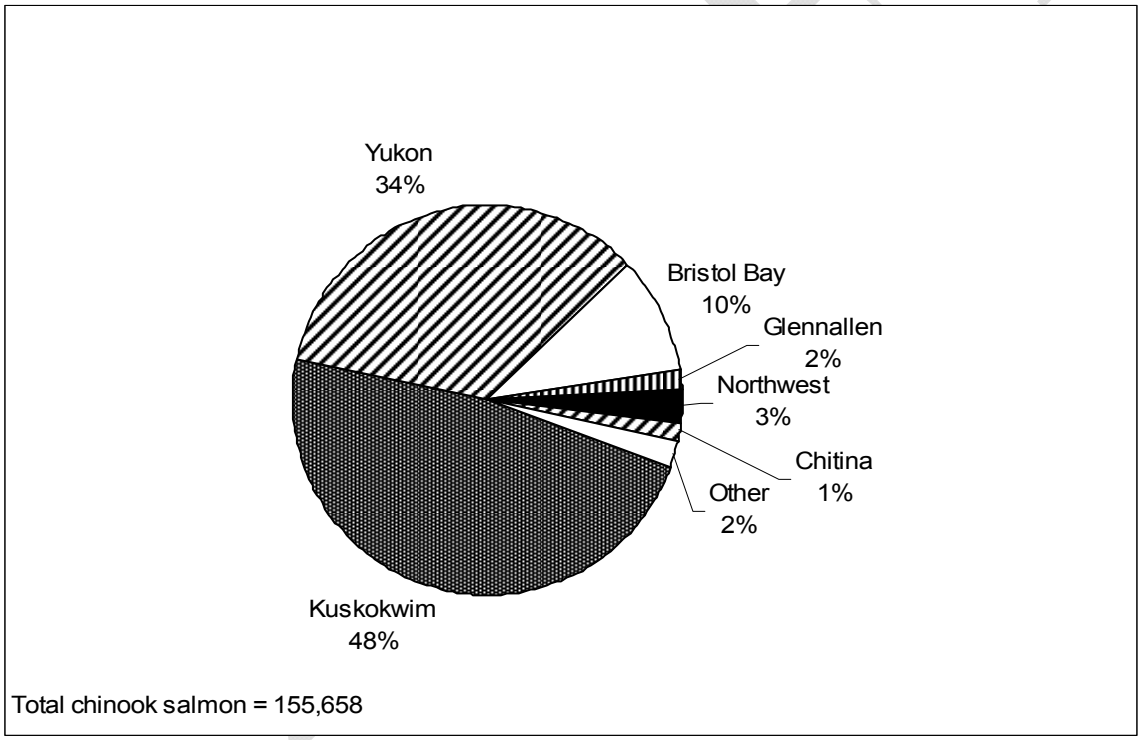

Fig. New -2 Estimated subsistence Chinook salmon harvest by area, 2005

Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

The estimated total subsistence harvest of salmon in Alaska in 2005, based on annual harvest assessment programs, was 1,052,564 fish.[13] The estimated statewide harvest by species was as follows: 461,804

[13]Note that personal use salmon harvests from Southeast Alaska, the Yukon Area, and the Chitina Subdistrict of the Upper Copper River are included in this statistic. Personal use fisheries that take place in nonsubsistence area of the

sockeye (43%), 257,977 chum (25%), 155,658 Chinook (15%), 100,095 coho (10%), and 77,031 pink salmon (7%).[14] Table II-2 (pp. 10 – 16) of the Alaska Subsistence Salmon Fisheries 2005 Annual Report reports subsistence harvests in 2005 by species and place of residence of participants, including total harvests from all subsistence fisheries combined. Figure New-3 below summarizes the report's estimates of subsistence takes of Chinook, chum, and other salmon, by subsistence harvest area for the period from 1994 - 2004.

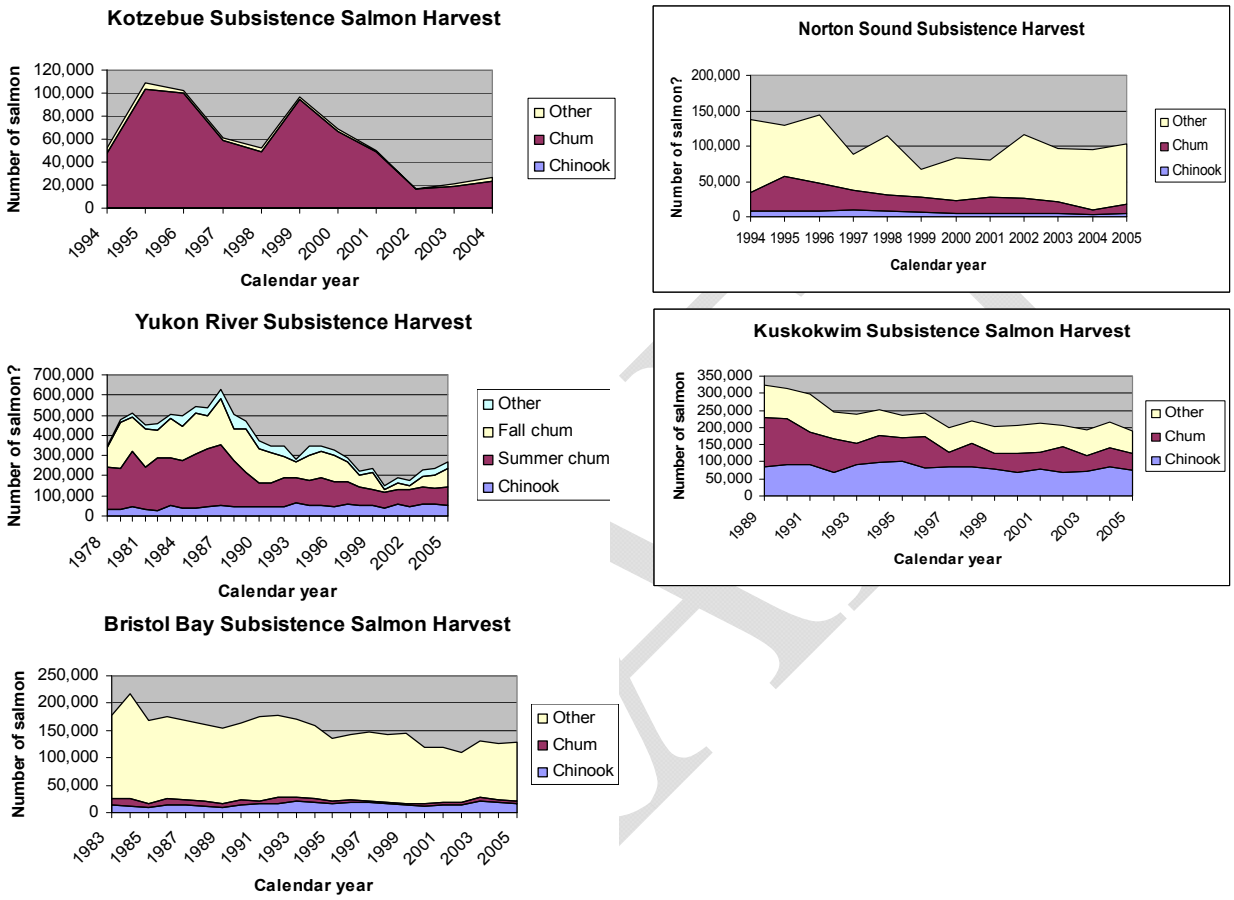

Fig. New -3 Estimated Subsistence Harvests of Chinook, Chum, and Other Salmon, by key management regions

Source: Based on information in the Alaska Subsistence Salmon Fisheries 2005 Annual Report.

The following list contains some primary points regarding regional significance:

- Chinook salmon appears to be of relatively limited importance in subsistence harvests north of Cape Prince of Wales in Kotzebue Sound and on Alaska's North Slope. Chinook salmon also appears to be of relatively limited importance along the Alaska Peninsula and Aleutians. Chinook did not appear to comprise more than 1% of subsistence harvests in Kotzebue between 1994 and 2004, no more than 3% on the Alaska Peninsula between 1985 and 2005, and to be almost 0% in the Aleutians in the same period. For simplicity, these areas are not included in the figure above.

Cook Inlet Management Area are not included. For background, see Chapter 1 of the Alaska Subsistence Salmon Fisheries 2005 Annual Report.

[14]See Figure II-2, p. 18, of the Alaska Subsistence Salmon Fisheries 2005 Annual Report.

- The Norton Sound region includes the Port Clarence and Norton Sound Districts. In this region, subsistence salmon harvests were dominated by chum salmon. For the district as a whole, Chinook accounted for between 4% and 10% of the subsistence salmon harvested between 1994 and 2005. Chinook were more important in the region's more southerly Norton Sound District, where they accounted for between 4% and 11% of the salmon caught; in the more northerly Port Clarence District they accounted for between 0% and 2% of the salmon caught.

- Chinook salmon are clearly a key species on the Yukon River. Summer and fall chum are still more important in numbers of fish, but Chinook currently account for 20% to 25% of the number of fish harvested. Prior to the large declines in the chum harvests in the early 1990s, Chinook accounted for a significantly smaller proportion of the harvest: from 6% to 23%. However, the count of each type of salmon does not account for other important considerations, including the relative size, flavor, and social and cultural significance.

- Chinook salmon are also clearly an important subsistence species in the Kuskokwim River region. Between 1989 and 2005, Chinook accounted for between 26% and 43% of the annual subsistence salmon harvest.

- Chinook salmon are important in the Bristol Bay region, although as a percentage of the harvest in the entire Bristol Bay area is lower because such a large portion of the area's subsistence harvest is sockeye salmon in the Kvichak drainage where there are no Chinook salmon. In districts where both sockeye and Chinook are available (Togiak, Naknek, and especially Nushagak) Chinook salmon comprise a higher percentage of the total, and in some years in the Nushagak at least may exceed sockeye when the harvests are measured in pounds (James Fall, ADF&G Subsistence Division, personal communication). Since 1993, Chinook harvests have ranged between 9% and 16% of subsistence harvests; before that, from 1983 to 1993, they ranged between 5% and 9%.

- Chinook salmon are the first salmon to arrive in the spring which is key to their importance for subsistence.

1.2.1.2 Northwest (Norton Sound and Port Clarence)

According to the Alaska Subsistence Salmon Fisheries 2005 Annual Report (ADF&G 2007):

> *Subsistence salmon fishing has been a major feature of life in northwest Alaska for centuries. In the early twenty-first century, most local residents in the region continue to participate in a mixed subsistence-cash economy, depending on local wild foods for cultural and nutritional sustenance. In summer, subsistence fishers harvest salmon with gillnets or seines in the main Seward Peninsula rivers and in the coastal marine waters. Beach seines are used near the spawning grounds to catch schooling or spawning salmon and other species of fish. The major portion of fish taken during the summer months is air dried or smoked for later consumption by local residents. Chum, pink, and coho salmon are found throughout the Norton Sound and Port Clarence districts, with Chinook salmon more common in eastern and southern Norton Sound and sockeye salmon more common in Port Clarence drainages.*[15]

[15]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 23.

As stated previously, many individuals and organizations provided written comment letters and testified to the Council during the development of the EIS, on their dependence on Chinook salmon. These comments are part of the administrative record and considered during decision making. One example of public comment received from the Kawerak, Inc. (p. 1) follows

> *The people of the Bering Strait/Norton Sound region depend on the salmon they harvest and put away each year. Salmon is a healthy, fresh food and teaching the traditional methods for food production is a time honored way to involve our children.*[16]

According to ADF&G, Unalakleet River Chinook salmon runs have declined precipitously since 2000. Escapement goals have only been reached once since 2003. Additionally, early closures to the Chinook salmon subsistence fishery have occurred in five of the previous six years. The 2008 escapement and subsistence harvests were the lowest on record. Unalakleet River Chinook salmon were designated a stock of yield concern in 2004 by the Alaska Board of Fisheries (BOF), and the BOF continued this designation in 2007. In an effort to further conserve Chinook salmon and restore the stock to historical yield levels, the BOF adopted a new management plan (5 AAC 04.395) that incorporates a more restrictive subsistence fishing schedule. Prior to 2007, subsistence fishing was open continuously in the marine waters and in river subsistence fishing was only closed for 36 hours a week. Under the newly adopted plan, subsistence fishing from June 15 to July 15 in the Unalakleet Subdistrict is limited to two 48-hour periods per week in the marine waters, and two 36-hour periods per week in the Unalakleet River. Under the newly adopted plan, subsistence fishing from June 15 to July 15 in the Unalakleet Subdistrict is limited to two 48-hour periods per week in the marine waters, and two 36-hour periods per week in the Unalakleet River. The new management plan also directs ADF&G to close the fishery if it is projected that the lower end of the North River tower-based sustainable escapement goal range (1,200-2,600) will not be reached. Prior to 2007, management biologists implemented restrictions and/or early closures based on test fishery catches and tower counts. Since 2007, subsistence fishery catch rates in conjunction with Chinook passage estimates have been used to evaluate run strength in season. (Scott Kent, ADF&G, personal communication).

Magdanz et al. (2005) reviewed several studies of subsistence consumption for the Norton Sound and Port Clarence areas Average per capita consumption of subsistence foods was on the order of 600 pounds per year in some communities. Salmon accounted for a significant part of this with weights ranging from about 100 pounds to about 160 pounds per capita, depending on the study. One analysis of dietary sources of meat and fished showed that 75% was derived from subsistence sources and 25% from store-bought meats (see Figure New-4). A third of the meat and fish was salmon, and the remainder was from land or marine mammals, or other fish. In this region, Chinook salmon accounted for 3% of meat and fish consumption, while chum salmon accounted for about 6% (Magdanz et al. 2005).

Figure New-4 below outlines results of a traditional diet survey in the Norton Sound and Port Clarence Districts, focused on sources of meat and fish (see Magdanz et al, 2005).[17]

[16] Letter from L. Bullard, President, Kawerak, Inc., to D. Mecum, Acting Administrator, AK Region, NMFS. Comment letter 12, dated January 30, 2009.
[17] http://www.subsistence.adfg.state.ak.us/TechPap/tp294.pdf, p. 25

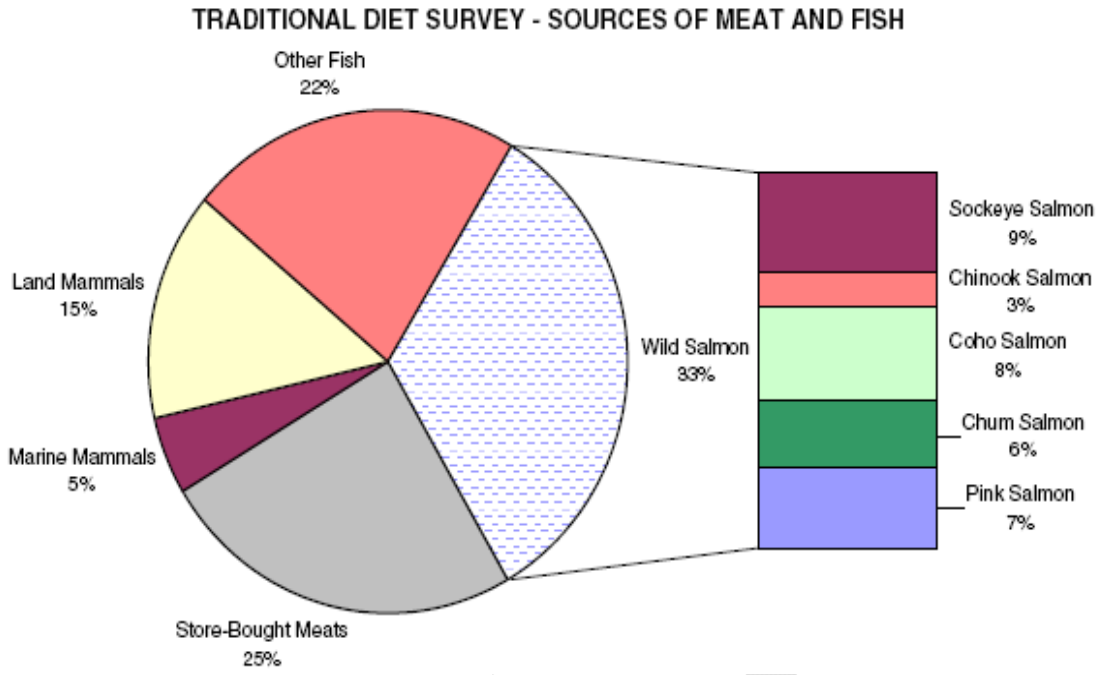

Fig. New -4 Results of a traditional diet of meat and fish survey in the Norton Sound and Port Clarence Districts
Source: Magdanz et al. 2005, citing Ballew et al. 2004[18]

Estimated subsistence salmon harvests from 1994 through 2003 trended lower by 5.8 percent annually. Most of the declines occurred during the first five years (1994 - 1998), when harvests trended lower by about 8 percent annually. During the latter years (1999 - 2003), harvests trended lower by about 1 percent annually across all communities. While harvests appeared to have stabilized in the latter years, it would not be correct to characterize the overall situation as improving, at least through 2003. For half of the study communities, the lowest estimated harvests occurred in 2003.

Despite variation in household harvests, there were harvest patterns, patterns that might be used to refine estimation and prediction. Through many different levels of abundance, through a decade of varied weather, with harvests ranging from 67,000 to 140,000 salmon, each year about 23 percent (range varies from 21.8 percent to 24.6 percent) of the households harvested 70 percent of the salmon, by weight. Predictable patterns were also apparent in the harvests by the age and gender of household heads.[19]

The Alaska Subsistence Salmon Fisheries 2005 Annual Report provides the estimated subsistence salmon harvests by the three districts in Northwest Alaska, from 1994 – 2005 (refer to Table III-2 in that report).[20] The estimated 2005 subsistence harvest of salmon by study communities in the Norton Sound District was 84,000 fish, with 4,087 being Chinook. This was the highest overall salmon harvest since 1998, with the exception of 2002. There was a strong coho return in 2005, and above average runs of

[18] http://www.subsistence.adfg.state.ak.us/TechPap/tp294.pdf, p. 25
[19] Magdanz et al. Patterns and Trends in Subsistence Salmon Harvests, Norton Sound and Port Clarence, 1994 – 2003. August 2005. ADF&G, Division of Subsistence, Technical Paper Series, No. 294, Abstract, page i. http://www.subsistence.adfg.state.ak.us/TechPap/tp294.pdf
[20] Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 28. http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf

chum and pinks. The Chinook run was poor (Menard 2005:1). Figures New-5 and New-6 show the species composition of the total subsistence salmon in 2005 for Norton Sound and Port Clarence. Very little of the documented subsistence salmon harvest was taken by residents from outside the district.

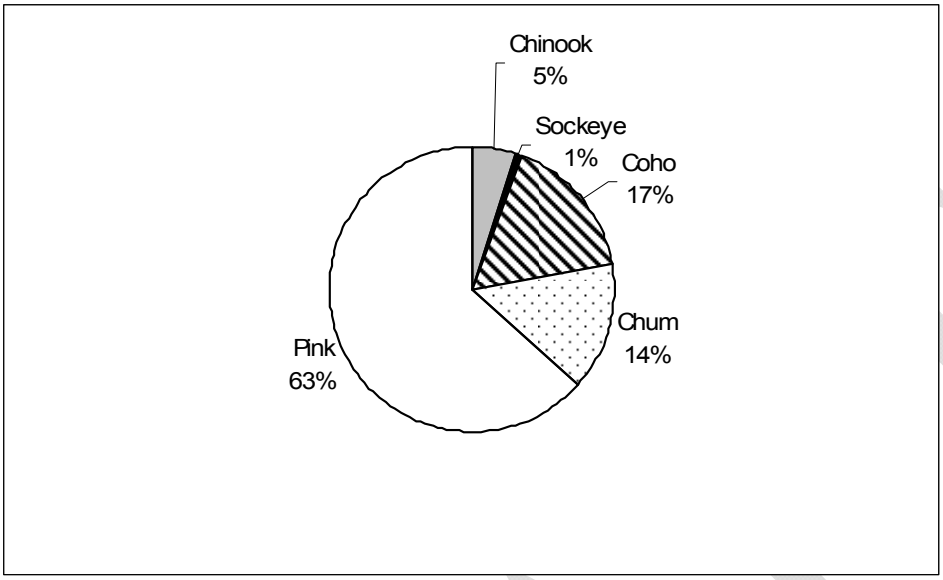

Fig. New -5 Species composition of 2005 estimated subsistence salmon harvests, Norton Sound District

Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

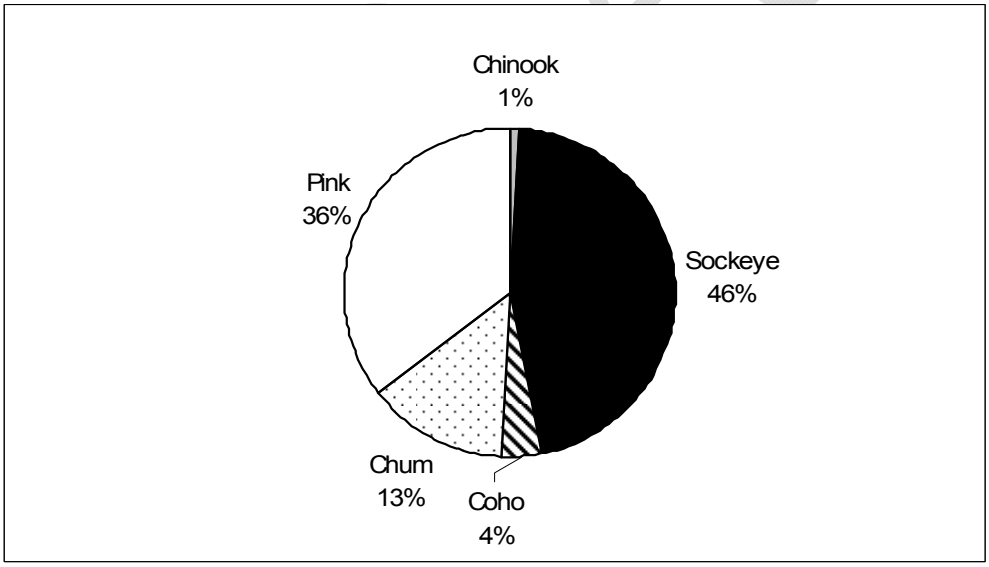

Fig. New -6 Species composition of 2005 estimated subsistence salmon harvests, Port Clarence District

Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

1.2.1.3 Yukon

According to the Alaska Subsistence Salmon Fisheries 2005 Annual Report (ADF&G 2007):

> *The majority of this section is excerpted from the Alaska Subsistence Salmon Fisheries 2005 Annual Report, unless noted otherwise. Residents of the Yukon River drainage have long relied on fish for human food and other subsistence uses. While non-salmon fish species provide an important component of the overall fish harvest (Andersen et al., 2004; Brown et al., 2005), salmon comprises the bulk of the fish harvested for subsistence. Chinook, summer chum, fall chum, and coho salmon comprise the majority of the salmon harvests in the Yukon river drainage, and the number of salmon harvested for subsistence in this region is significant. Unlike many marine and coastal fisheries where commercial harvests predominate, subsistence salmon harvests within the Yukon drainage often exceed commercial, sport, and personal use harvests combined.21*

Drift gillnets, set gillnets, and fish wheels are used by Yukon Area fishers to harvest the majority of salmon. Set gillnets are utilized throughout the Yukon Area, in the main rivers and coastal marine waters, while drift gillnets are used extensively in some parts of the river (i.e., by state regulation, that portion of the Yukon drainage from the mouth to 18 miles below Galena). Fish wheels are a legal subsistence or non-commercial gear type throughout the Yukon drainage, although due to river conditions and the availability of wood, they are used almost exclusively on the upper Yukon and Tanana rivers.

Depending on the area of the Yukon River drainage and run timing of different salmon species, subsistence fishing occurs from late May through early October. Fishing activities are either based from fish camps or from the home villages; fishing patterns and preferred sites vary from community to community. Extended family groups, typically representing several households, often undertake subsistence salmon fishing together. Households and related individuals typically cooperate to harvest, process, preserve, and store salmon for subsistence use.

The majority of the subsistence salmon harvest is preserved for later use by freezing, drying, or smoking, while the head, cutting scraps, and viscera are often fed to dogs. Chinook salmon are harvested and processed primarily for human consumption, although those fish deemed not suitable for human consumption due to presence of the fungus *Ichthyophonus hoferi* or some other disease or disfigurement are often fed to dogs. Small (jacks) Chinook salmon or spawned out fish may also be fed to dogs. In addition, while chum and coho salmon are primarily taken for human consumption, relatively large numbers are harvested and processed to feed sled dogs. Fall chum and coho salmon typically arrive in the upper portion of the drainage late in the season, coincident with freezing weather, allowing fish to be "cribbed" for use as dog food. This method involves the natural freezing of whole (un-cut) fish. The practice of keeping sled dogs is much more common in communities along the upper Yukon Area than in the lower river communities.

Walker et al (1989)[22] state the following:

> *Salmon fishing occurs from late May through October, although this varies throughout the drainage. Fishing activities are based either from a fish camp or the home village, however, the*

[21] Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 33.
[22] 1989. Subsistence Harvest of Pacific Salmon in the Yukon River Drainage, Alaska 1977 – 88. http://www.subsistence.adfg.state.ak.us/TechPap/tp187.pdf

> *degree to which one or the other is more prevalent has varied from community to community. Some people from communities not situated along the Yukon River operated fish camps along it, and these have included Birch Creek, Venetie, and some residents of Chalkyitsik. Subsistence salmon fishing was often undertaken by extended family groups representing two or several households in a community. These groups, as well as members of individual households, cooperated to harvest, cut, dry, smoke, and store salmon for subsistence use. Many people who fished for subsistence also operated as commercial fishermen in districts where commercial fishing has been allowed and families had a member with a Commercial Fisheries Entry Commission (CFEC) permit.* (p. 3.)

According to ADF&G, as a result of production rates below expectations of king salmon returning to the Yukon River, the BOF classified the Yukon River king salmon stock as a yield concern. With that, the Board modified the king salmon management plan to a more conservative approach early in the season when run assessment is less certain. Management is still based on inseason assessment, but subsistence fishing opportunity was restricted to fishing windowed periods to spread harvest and reduce risk until the run progresses further when it can be better assessed. The subsistence fishery would then be regulated as appropriate based on the assessed strength of the run inseason with less reliance on the preseason projection. In 2001 there were significant subsistence fishing time reductions with no directed commercial king fishing. Since then, subsistence fishing windows have been in place early in the season and were eventually removed when available surpluses were substantiated by in-river assessment. In some instances, actual subsistence fishing time was increased when in climate weather and fishing conditions hindered fishing efforts. And in 2008, the subsistence fishery began the season on the widowed fishing scheduled. Assessment indicated the king run was low and dictated management to take actions to further conserve the stock. Subsistence fishing times were reduced to 50% throughout the drainage during the peak of the run and gillnet mesh size was restricted to a maximum of 6 inches in the lower river subsistence fishery to provide an opportunity to target summer chum while conserving additional king salmon. Our management is still escapement goal based, but our actions have become more conservative due to the observed decline in Yukon River king salmon production rates which has resulted in less subsistence fishing opportunity and more structured in recent years. (Fredrick Bue, ADF&G, personal communication).

In 2005, 1,022 households (46% of the total households in Districts 1 - 5), 355 subsistence permit holders (91% of the 391 issued), and 69 personal use permit holders (95% of the 73 issued) provided harvest data for the Yukon Area subsistence/personal use salmon fishery (Busher et al., 2007). The estimated 2005 subsistence/personal use salmon harvest for the entire Yukon Area broken down by species included 53,547 Chinook (20%), 93,411 summer chum (35%), 91,667 fall chum (34%), 27,357 coho (10%), and 3,132 pink (1%), for a total estimate of 269,114 salmon (see Figure New-7). (The Alaska Subsistence Salmon Fisheries 2005 Annual Report notes that this is an estimated total based on household surveys and returned permits and calendars, and it includes subsistence harvests, personal use harvests, commercial harvests retained for home use, and fish distributed from ADF&G test fisheries.)

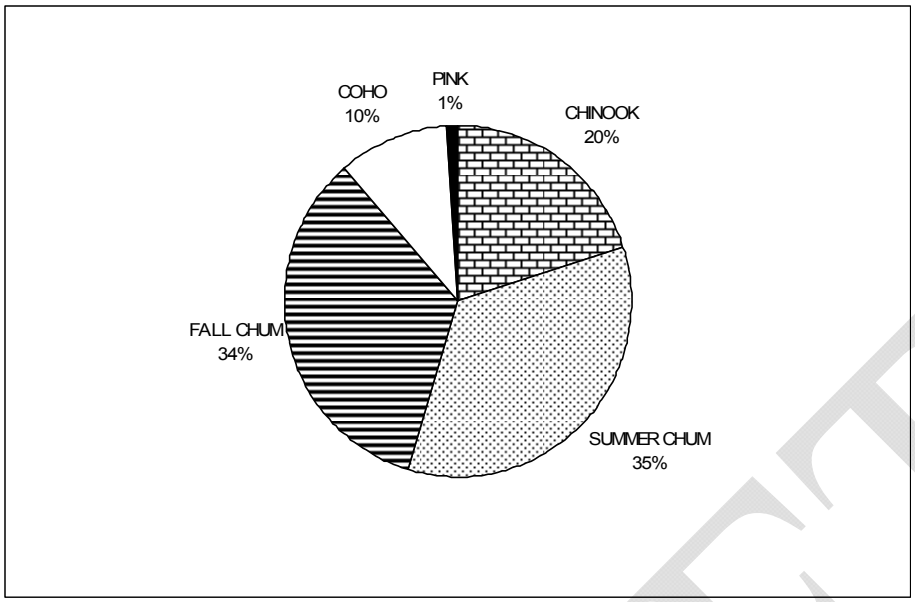

Fig. New -7 Species composition of 2005 estimated subsistence salmon harvests, Yukon District
Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

Since the extremely low harvest levels in 2000 (152,300 total salmon), subsistence Chinook and coho salmon harvests have unsteadily increased while fall chum salmon harvests have rebounded significantly. The 2005 harvest estimates registered above the recent 5-year averages for all species, except the Chinook salmon harvest estimate, which was only 144 fish below the 5-year average. The estimated harvests for all species registered above the most recent 10-year averages. Nonetheless, while summer chum and fall chum salmon estimated harvests are increasing, they still show considerable declines compared to harvests averaged for the last two decades. Note, however, that the ADF&G Alaska Subsistence Salmon Fisheries Annual Report, which provides the majority of these statistics, is only available through 2005.

As stated previously, many individuals and organizations provided written comment letters and testified to the Council during the development of the EIS, both on their dependence on Chinook salmon and the relative declines they are experiencing in the Yukon River drainage area. Again, these comments are part of the administrative record and considered during decision making. One example of public comment received from the Yukon River Drainage Fisheries Association (p. 2) follows:

> *"The weak Chinook salmon run of 2008 has already created problems of crisis proportions along the Yukon River. While subsistence restrictions limited the amount of food available for the winter, the lack of a commercial Chinook fishery cut off one of the only sources of income for many Yukon River residents. Cold winter temperatures and high fuel prices have made the lack of commercial fishery income even more drastic this season. The promise of the same or worse Chinook salmon return in 2009 is no comfort."*

Another example from public comment from the Alakanuk Tribal Council (pg. 1) explains the existing conditions of subsistence on the Yukon River as follows:

> *"The high salmon bycatch numbers of recent years in the pollock fishery threaten our salmon and our way of life. Salmon serves an important cultural and economic role in my community and throughout western Alaska. Salmon provides a primary source of food for us, and the commercial salmon harvest provides the only means of income for many who live in the remote*

villages of the Yukon River. Salmon is an irreplaceable resource that must be protected by all means. Once again the lower Yukon River villages will be carrying the burden of conservation, even though the cause of salmon decline is not the result of subsistence users along the river. To our understanding, there may not be enough Chinook salmon for subsistence users this coming summer."[23]

Finally, note that in 1993, the BOF made a positive finding for Customary and Traditional Use for all salmon in the Yukon-Northern Area. The 'Amount Reasonably Necessary for Subsistence Use' determination (ANS) was established at 348,000 - 503,000 salmon for all species combined. Since 1990, the overall total subsistence salmon harvest in the Yukon Area has declined by approximately 30%. Under this regime, 1992 marked the last year when total subsistence salmon harvests fell within the combined ANS range. In 2001, the BOF broke this figure down by species. A species-specific ANS range provides one index for measuring the extent to which reasonable opportunity was provided in the subsistence fishery. Harvests below the lower bound of the ANS range may indicate, with other evidence such as poor runs and fishing restrictions, that there was not a reasonable opportunity for subsistence uses during the previous season. Harvests consistently lower than the lower bound of the ANS are an indication to the BOF to consider whether additional management actions are necessary to provide reasonable subsistence opportunities. In the years 1998, 2000 to 2003, reduced fishing times or fishery closures were implemented during summer or fall or both seasons due poor or weak runs. Hence opportunity was reduced to allow for escapement (William H. Busher, ADF&G, personal communication).

According to ADF&G, the following management measures were implemented:

- 1998 - Subsistence schedule reduce on upper Yukon and Tanana rivers fall season, Personal Use was closed
- 2000 – Subsistence schedule initially reduced, Personal use closed, then Subsistence closed for fall season drainagewide. WF gear restriction 4 inch mesh or less gillnets
- 2001- Subsistence schedule reduced then closed late summer season, early fall season, then opened in all districts. Personal Use closed part of summer and all of fall season.
- 2002 - Subsistence closures early portion and then reduced schedule during fall season in all districts. Personal use closures most of fall season.
- 2003 - Subsistence reduced schedule early portion of fall season on Yukon except Tanana River

It is important to note that 2005 marked the first year that the harvests of all species were within their respective ANS ranges. See Table New-1 for a comparison of ANS ranges and recent years' subsistence salmon harvests.[24]

[23]Letter from B. Phillip, President, Alakanuk Tribal Council to R. Mecum, Acting Administrator, AK Region, NMFS. Comment letter 5, Dated January 23, 2009.
[24]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 43.
http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf

Table New-1 Comparison of amounts necessary for subsistence (ANS) and estimated subsistence salmon harvests, Yukon Area, 1998-2005

	Estimated Number of Subsistence Salmon Harvested[1]			
	Chinook	Summer Chum	Fall Chum	Coho
ANS[2] / Year	45,500-66,704	83,500-142,192	89,500-167,900	20,500-51,980
1998	52,910	81,858	59,603	16,606
1999	50,711	79,348	84,203	20,122
2000	33,896	72,807	15,152	11,853
2001	53,462	68,544	32,135	21,977
2002	42,117	79,066	17,908	15,619
2003	55,221	78,664	53,829	22,838
2004	55,102	74,532	61,895	24,190
2005	53,409	93,259	91,534	27,250

[1] Estimates for 1998-2004 do not include personal use harvests, ADF&G test fishery distributions, or salmon removed from commercial harvests. Estimates for 2005 include test fishery distributions because the Amounts Necessary for Subsistence are based on harvests from 1990-1999 and included test fishery distributions. Shaded cells indicate harvest amounts are below the minimum ANS.

SOURCE: 2005 harvest data is from the Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report: Subsistence and Personal Use Salmon Harvests in the Alaska Portion of the Yukon River Drainage, 2005. Appendices B1-B4. Preliminary results as of Oct 23, 2006.

Table Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

1.2.1.4 Kuskokwim

According to the Alaska Subsistence Salmon Fisheries 2005 Annual Report (ADF&G 2007):

> *The Kuskokwim Area subsistence salmon fishery is one of the largest in the state. From June through August, the daily activities of many Kuskokwim Area households revolve around harvesting, processing, and preserving salmon for subsistence use. The movement of families from permanent winter residences to summer fish camps situated along rivers and sloughs continues to be a significant element of the annual subsistence harvest effort. The ADF&G Division of Subsistence studies in the region indicate that fish contribute as much as 85% of the total pounds of fish and wildlife harvested in a community, and salmon contribute as much as 53% of the total annual harvest (Coffing, 1991). The harvest of salmon for subsistence use is as much as 650 pounds per capita in some Kuskokwim River communities.*

Walker and Coffing (Subsistence Salmon Harvests in the Kuskokwim Area During 1989)25 state the following:

> *The harvest of salmon in the Kuskokwim Area has been and continues to be important both in the subsistence economy and also in the market economy. Subsistence and commercial fishermen, often the same individuals, share a real interest in the maintenance of the sustained yield of salmon stocks in the Kuskokwim Area.*

[25] http://www.subsistence.adfg.state.ak.us/TechPap/tp189.pdf

> *Communities which depend upon the harvest of salmon for subsistence are situated throughout the Kuskokwim River drainage, along Kuskokwim Bay, and along the Bering Sea coast. In 1989, there were over 3,400 households in these communities, most of which use salmon for subsistence. Although not all households actively participated in harvesting salmon, many were directly involved in cutting and processing the fish and in distributing the finished products to other households.* (p. 58)

For the 15-year period from 1989 through 2003, an estimated annual average of 1,443 households participated in the Kuskokwim Area subsistence salmon fishery (Simon et al. 2007). Many households not directly involved in catching salmon assist family and friends with cutting, drying, smoking, and associated preservation activities (salting, canning, and freezing). Annual subsistence surveys are aimed at gathering harvest data on Chinook, chum, sockeye, and coho salmon.

There are 38 communities consisting of approximately 4,597 households within the Kuskokwim Area. The majority (76%) of the households are situated within the Kuskokwim river drainage. Bethel is the largest community in the region, consisting of approximately 1,739 households. The north Kuskokwim Bay communities of Kwigillingok, Kongiganak, and Kipnuk are comprised of about 357 households. North Kuskokwim Bay subsistence fishers harvest salmon in the Kuskokwim River as well as from areas closer to their communities. Residents of Quinhagak, Goodnews Bay, and Platinum, located along the south shore of Kuskokwim Bay (approximately 220 households), harvest salmon primarily from the Kanektok, Arolik, and Goodnews river drainages. The Bering Sea coast communities of Mekoryuk (on Nunivak Island), Newtok, Tununak, Toksook Bay, Nightmute, and Chefornak are composed of approximately 514 households. Subsistence users from these communities harvest salmon from coastal waters as well as local tributaries.[26]

A summary of the subsistence salmon harvest estimates by community and fishing area is provided in Table V-2 of the Alaska Subsistence Salmon Fisheries 2005 Annual Report, (p. 56). In 2005, subsistence salmon harvest estimates for communities contacted in the Kuskokwim Area totaled 74,354 Chinook (39%), 48,396 chum (25%), 37,003 sockeye (19%), 29,963 coho (16%), and 1,303 pink (1%), for a total estimate of 191,019 salmon (see Fig. New-8 below). The Alaska Subsistence Salmon Fisheries 2005 Annual Report notes in the sampling summary section that these are minimum estimates because no households were contacted in some communities. In other communities, too few households were contacted to produce an expanded community estimate.

[26]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 47.
http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf

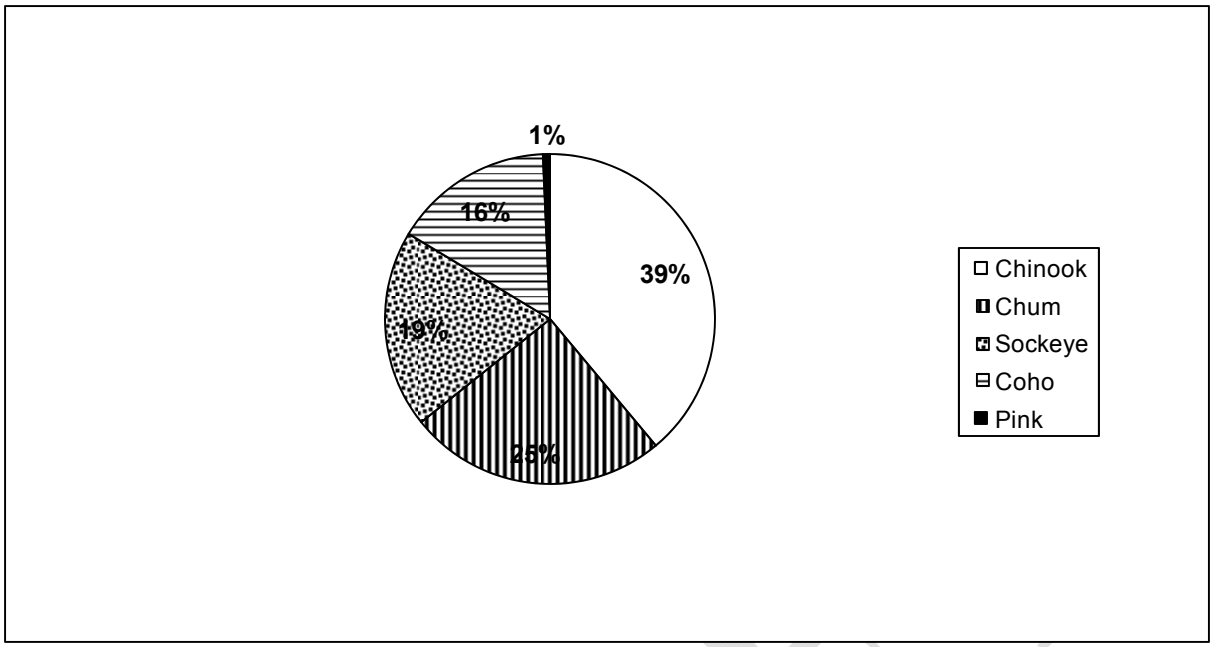

Fig. New -8 Species composition of 2005 estimated subsistence salmon harvests, Kuskokwim Area
Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

Lower Kuskokwim River area communities accounted for 80% of the 2005 subsistence salmon harvests in the Kuskokwim Area and 82% of the entire Chinook subsistence catch. Residents of Bethel accounted for 33% of the Kuskokwim Area subsistence harvests and 33% and 41% of all subsistence caught Chinook and coho salmon, respectively. Subsistence salmon harvests in the Kuskokwim Area in 2005 varied from previous years, with all harvests below recent averages. The estimated 2005 Chinook salmon subsistence harvest represented a decrease of 13% from 2004. The Chinook harvest was 10% below the 1989 - 2005 average, and 2% below the 5-year average.[27]

1.2.1.5 Bristol Bay

According to the Alaska Subsistence Salmon Fisheries 2005 Annual Report (ADF&G 2007):

> *In spite of numerous social, economic, and technological changes, Bristol Bay residents continue to depend on salmon and other fish species as an important source of food. Residents have relied on fish to provide nourishment and sustenance for thousands of years. Subsistence harvests still provide important nutritional, economic, social, and cultural benefits to most Bristol Bay households. All five species of salmon are utilized for subsistence purposes in Bristol Bay, but the most popular are sockeye, Chinook, and coho. Many residents continue to preserve large quantities of fish through traditional methods such as drying and smoking, and fish are also frozen, canned, salted, pickled, fermented, and eaten fresh.28*

[27]Alaska Subsistence Salmon Fisheries 2005 Annual Report, Table V-3, p. 57.
[28]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 61.
http://www.subsistence.adfg.state.ak.us/TechPap/tp318.pdf

As stated previously, many individuals and organizations provided written comment letters and testified to the Council during the development of the EIS. The Bristol Bay Alaska Subsistence Regional Advisory Council, which represents 31 Bristol Bay subsistence communities, provided the Council with a letter and resolution approved in October 2008 relative to the proposed action.[29] These comments are part of the administrative record and considered during decision making. Excerpts from that resolution are provided here:

> *"The BBRAC requests the North Pacific Fisheries Management Council (NPFMC) and NOAA to note that in the 2007 and 2008 seasons, several Bristol Bay rivers did not achieve the Chinook salmon escapements forecasted by the Alaska Department of Fish and Game (ADF&G)...Poor or reduced escapements of Chinook salmon into Bristol Bay rivers can have significant effects on the Region's subsistence, commercial and sport fisheries."*(p.2)

A recent ADF&G report of surveys and interviews in five Bristol Bay communities revealed that most subsistence resources in Bristol Bay are distributed through sharing, with no immediate exchange and no expectation of any return in the future (Krieg et al, 2007).30 In the five study communities (Dillingham, Naknek, Togiak, King Salmon and Nondalton), 27 households (21%) had a history of involvement in cash trade of subsistence-caught fish, and 16 households (13%) engaged in cash trade in the 2004 study year. Cash trade most often involved value-added products such as smoked sockeye or Chinook salmon, resembling a form of craft production rather than commercial manufacture. Of 40 cash trade transactions, 28 involved less than $100. In the five study communities, 54 households (42%) had a history of involvement in barter of subsistence-caught fish, and 48 households (38%) bartered fish for other goods or services in 2004. Surveyed households described 143 barter transactions in 2004 that included the exchange of 386 items or services; Chinook salmon (24% of all items bartered) and sockeye salmon (18%) were most often involved in barter. Market goods (17% of the items bartered) and services (7%) were also part of barter transactions for subsistence-caught fish.

This same report notes that exchanges of resources between residents of contemporary Bristol Bay communities, and with residents of communities outside the area, are common. It states:

> "*For example, in Manokotak, a Central Yup'ik community east of Togiak, Schichnes and Chythlook (1988:77-78) identified 18 other communities from which community residents received subsistence foods and 15 to which Manokotak residents sent subsistence foods. The authors speculated that this sharing involved "gifts" (trade was not mentioned) to relatives in Anchorage and Dillingham who could not obtain their customary "Native foods" in those locations.*
>
> *An important point of view expressed by Bristol Bay Yup'ik elders from western Bristol Bay communities during this study and others conducted by the Division of Subsistence was that in the past, they primarily harvested and processed meat, fish, berries, and greens for survival and not with the intent of exchange for cash or other exchange value. They stated that they preferred to give subsistence foods to someone in need, rather than trade the resources for cash. For the most-senior generation of elders, those 80 or more years of age, subsistence foods were never associated with money. Elders stated that if a family was needy, they simply gave subsistence foods to them, and expected nothing back."* (p. 14)

[29]Letter and resolution from R. Alvarez, Chair, Bristol Bay Alaska Subsistence Regional Advisory Council to E. Olson, Chair, NPFMC, regarding Chinook salmon bycatch in the Bering Sea pollock fisheries (10/28/08).
[30]Krieg et al., *Sharing, Bartering and Cash Trade in Bristol Bay*, October 2007, abstract, p. v. http://www.subsistence.adfg.state.ak.us/TechPap/Tp326.pdf

The report also states that there is evidence that younger generations in Bristol Bay communities have become more accustomed to the practice of trading subsistence foods for cash rather than for other subsistence products. The report summarizes that the trade or barter in subsistence products has occurred and continues to occur in the Bristol Bay area, and that the role of cash in these types of exchanges has increased with the move toward a 'mixed economy.'

The estimated total Bristol Bay subsistence salmon harvest in 2005 was 128,811 fish.[31] This number was about the same as the estimates for 2003 and 2004, but was higher than the 2002 estimate (109,587). The 2005 harvest was 2% below the recent 10-year average of 131,318 salmon and about 16% below the recent 23-year average of 152,778 salmon. In 2005, as over the last several decades, most of the Bristol Bay Area subsistence harvest was taken in the Naknek/Kvichak (56%) and the Nushagak (37%) districts.

Note that the area-wide Chinook harvest of 15,212 salmon in 2005 was down from the estimate of 18,012 Chinook for 2004 and the record harvest of 21,231 Chinook estimated for 2003, but was higher than any other estimate since 1998 and similar to both the recent 10-year average (15,913 Chinook) and 23-year average (14,998 Chinook).

In 2005, the Bristol Bay subsistence salmon harvest was composed of: 77% sockeye; 12% Chinook; 6% coho; 5% chum; and 1% pink salmon (Figure New-9).[32] Of the entire Bristol Bay Area subsistence salmon harvest in 2005, residents of Bristol Bay communities harvested 119,789 salmon (93%), and other Alaska residents harvested 9,022 salmon (7%).

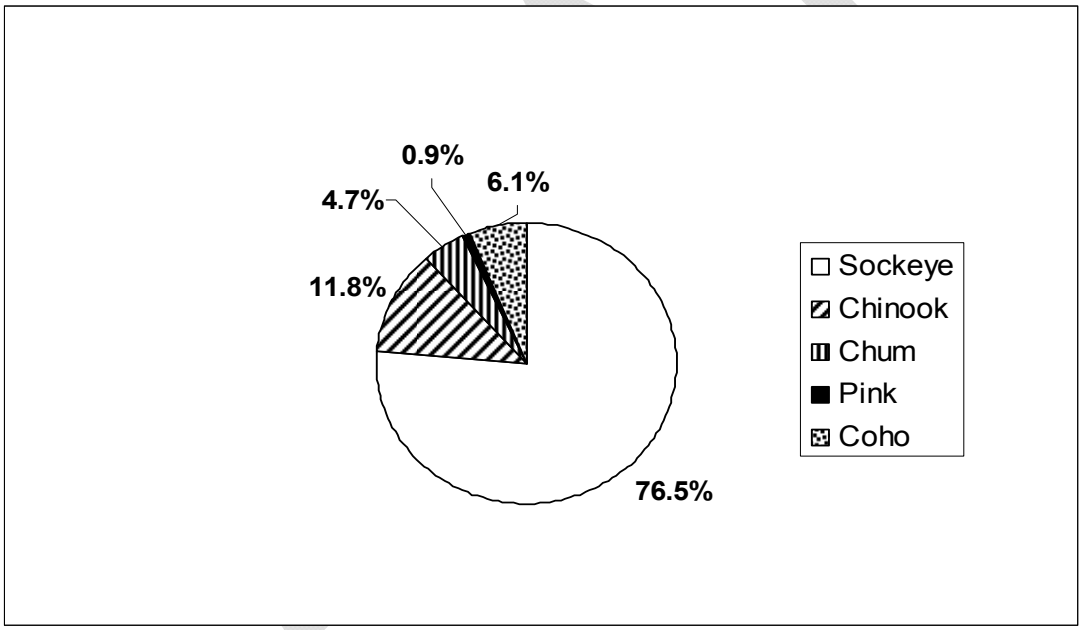

Fig. New -9 Species composition of 2005 estimated subsistence salmon harvests, Bristol Bay Area
Source: The Alaska Subsistence Salmon Fisheries 2005 Annual Report.

[31]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 69.
[32]Alaska Subsistence Salmon Fisheries 2005 Annual Report, p. 64.

Additional References not in the DEIS

Alaska Natives Commission. 2004. Final Report. URL: http://www.alaskool.org/resources/anc/anc_toc.htm.

Ballew, C., A. Ross, R. Wells, V. Hiratsuka, K.J. Hanrick, E.D. Nobmann, and S. Barell. 2004. Final Report on the Alaska Traditional Diet Survey. Alaska Native Epidemiological Center. Anchorage, Alaksa.

Bering Sea Elders Advisory Group. 2009. Public comment on the Chinook Salmon Bycatch Draft EIS. Letter from D. Bill, Sr., Chairman to D. Mecum, Acting Regional Administrator, NOAA. February 20, 2009.

Busher, William H., T. Hamazaki and A. M. Marsh. Subsistence and Personal Use Salmon Harvests in the Alaskan Portion of the Yukon River Drainage, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 07-52, Anchorage.

Buklis, Lawrence S. 1999. A Description of Economic Changes in Commercial Salmon Fisheries in a Region of Mixed Subsistence and Market Economies. ARCTIC, Journal of the Arctic Institute of North America, Volume 52, No. 1 (March 1999). P. 46.

Coffing, Michael W. 1991. Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use, and the Subsistence Economy of a Lower Kuskokwim River Area Community. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper Series, No. 157. Juneau, Alaska.

Fall et al. 2007. Alaska Subsistence Salmon Fisheries 2005 Annual Report, December 2007. ADF&G, Division of Subsistence, Technical Paper Series, No. 318. Juneau, Alaska.

Krieg et al. 2007. Sharing, Bartering and Cash Trade in Bristol Bay, October 2007. ADF&G, Division of Subsistence, Technical Paper Series, No. 326. Juneau, Alaska.

Magdanz et al. 2005. Patterns and Trends in Subsistence Salmon Harvests, Norton Sound and Port Clarence, 1994 – 2003. August 2005. ADF&G, Division of Subsistence, Technical Paper Series, No. 294. Juneau, Alaska.

Moncrieff, Catherine F. 2007. Traditional ecological knowledge of customary trade of subsistence harvested salmon on the Yukon River. Yukon River Drainage Fisheries Association, Anchorage, AK.

Simon, Jim, Tracie Krauthoefer, David Koster, and David Caylor. 2007. Subsistence Salmon Harvest Monitoring Report, Kuskokwim Fisheries Management Area, Alaska, 2004. ADF&G, Division of Subsistence, Technical Paper Series, No. 313. Juneau, Alaska.

Walker and Coffing. 1993. Subsistence Salmon Harvests in the Kuskokwim Area During 1989. February 1993. ADF&G, Division of Subsistence, Technical Paper Series, No. 189. Juneau, Alaska.

Walker et al. 1989. Subsistence Harvest of Pacific Salmon in the Yukon River Drainage, Alaska, 1977 – 88. October 1989. ADF&G, Division of Subsistence, Technical Paper Series, No. 187. Juneau, Alaska.

Wolfe, Robert J. 1987. "The super-household: specialization in subsistence economies." Paper presented at the 14th Annual Meeting of the Alaska Anthropological Association. March 12 – 13, Anchorage, Alaska.

Wolfe, Robert J. and Walker, Robert J. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. ADF&G, Division of Subsistence. Arctic Anthropology, Vol. 24, No. 2, pp. 56-81.

Wolfe, Robert J. 2000. Subsistence in Alaska: A Year 2000 Update. Alaska Department of Fish and Game, Divisions of Subsistence. Juneau.
URL: www.subsistence.adfg.state.ak.us/geninfo/publctns/articles.cfm#SUBSISTENCE_2000.

Wolfe, Robert J. 2003. People and Salmon of the Arctic, Yukon, and Kuskokwim. Socioeconomic Dimensions: Fishery Harvests, Culture Change, and Local Knowledge Systems. Paper presented to the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative Workshop, Anchorage, November 18-20, 2003, 35 pp.

Wolfe, Robert J. 2007. Human Systems and Sustainable Salmon: Social, Economic, and Cultural Linkages. Paper presented at the Sustainability of the Arctic-Yukon-Kuskokwim Salmon Fisheries Conference, Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative, Fairbanks, February 6-9, 2007, 14 pp.

Yukon River Drainage Association. 2009. Public comment on the Chinook Salmon Bycatch Draft EIS. Letter from R. Gisclair, Policy Director to D. Mecum, Acting Regional Administrator, NOAA, and E. Olson, Chair, NPFMC. January 26, 2009.

Appendix 10 – Price information update for Chapter 10

Chinook Salmon Bycatch Regulatory Impact Review Update for 2007 Pricing Corrections to Potentially Foregone Revenue and Revenue at Risk.

The Draft Environmental Impact Statement/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (DEIS) for Bering Sea Chinook Salmon Bycatch Management contains an analysis of potential impacts on the pollock fishery in terms of potential forgone first wholesale gross revenue (Atl 2, and Alt 4) and in terms of "revenue at risk" (Alt. 3). The revenue analysis uses total first wholesale value of all pollock products combined, divided by total round weight retained tons of landed pollock to establish the round weight equivalent first wholesale value, per ton, of pollock catch that could potentially be forgone and/or put at risk by the proposed action.

Total first wholesale value of all pollock products is tabulated by the Alaska Fisheries Science Center in preparing the annual Economic Status of Groundfish Fisheries off Alaska report (the Econ. SAFE) and is tabulate from data submitted by industry. Retained tons of pollock is tabulated from the National Marine Fisheries Service, Alaska Region e-landings system. The tabulation of total value is completed in November of the following year. Thus, 2007 total value data, and hence derived prices, were not available during the analysis of the proposed action in preparation for Council initial review in June of 2008. As a result, 2006 price data was used as a proxy to allow estimation of 2007 potential forgone revenue and revenue at risk. Further, analysis contained in the Public Review DEIS was completed prior to finalization of the 2007 numbers in order to allow internal review and document processing. Thus, the revision of the DEIS to its final version will contain updated 2007 prices, and revenue estimates, as depicted in this appendix to the Comments Analysis Report.

As shown in the following table (Note: this table does not appear in the DEIS and is shown here to illustrate the price difference between 2006 and 2007), pollock product total value and, hence prices per metric ton, increase considerably between 2006 and 2007 (except for Mothership A season prices). Note that CDQ data is confidential at the sector level in 2007. For all sectors combined, CDQ prices increased 11.4%, while non-CDQ prices increased 10.6%. The changes in non-CDQ sector prices are also shown below. These price changes are documented in the tables contained herein and these tables will replace the table (or the 2007 section of the table) of the same number in the DEIS when it is made final.

Percentage Increase in 2007 prices versus 2006 prices.

Percentage Difference			
Sector	Season	2007 versus 2006	
		CDQ	non-CDQ
CP	A	Conf	9.5%
	B	Conf	16.5%
Total		**Conf**	**12.5%**
M	A	Conf	-2.5%
	B	Conf	20.0%
Total		**Conf**	**8.3%**
S	A	n/a	8.0%
	B	n/a	9.0%
Total		**n/a**	**9.2%**
All	A	6.7%	7.4%
	B	16.5%	13.3%
Total		**11.4%**	**10.6%**

Note: Conf: Confidential due to fewer than three entities reported and/or the reporting of a sector split and the total for the category would violate confidentiality, thus the total is reported but not the sector data.

Corrected Wholesale Value Tables

Table 10-79: First Wholesale value of retained Pollock by sector, 2003-2007 ($ millions)

Sector	Season	2003		2004		2005		2006		2007	
		CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ
CP	A	$61.0	$200.7	$58.2	$253.9	$57.7	$282.1	$63.0	$258.8	Conf	$250.1
	B	$55.4	$172.9	$46.0	$188.2	$62.3	$244.2	$60.5	$241.1	Conf	$255.4
Total		**$116.4**	**$373.6**	**$104.2**	**$442.0**	**$120.0**	**$526.3**	**$123.5**	**$499.8**	**Conf**	**$505.5**
M	A	$6.0	$36.7	$6.7	$44.1	$6.9	$28.4	$6.2	$50.7	Conf	$46.6
	B	$5.4	$32.4	$5.0	$33.2	$5.5	$24.1	$5.0	$43.9	Conf	$47.9
Total		**$11.3**	**$69.1**	**$11.8**	**$77.3**	**$12.4**	**$52.5**	**$11.1**	**$94.6**	**Conf**	**$94.6**
S	A	$0.0	$206.3	$0.0	$220.9	$0.0	$262.4	$0.0	$249.2	0	$249.7
	B	$0.0	$249.3	$0.0	$225.4	$0.0	$273.6	$0.0	$268.6	0	$250.6
Total		**$0.0**	**$455.6**	**$0.0**	**$446.3**	**$0.0**	**$535.9**	**$0.0**	**$517.8**	**0**	**$500.3**
All	A	$66.9	$443.7	$64.9	$518.9	$64.6	$572.9	$69.2	$558.7	$68.0	$546.5
	B	$60.8	$454.6	$51.1	$446.7	$67.8	$541.9	$65.4	$553.6	$70.4	$554.0
Total		**$127.7**	**$898.3**	**$116.0**	**$965.6**	**$132.4**	**$1,114.8**	**$134.6**	**$1,112.3**	**$138.4**	**$1,100.4**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007. Note: Conf: Confidential due to fewer than three entities reported and/or the reporting of a sector split and the total for the category would violate confidentiality, thus the total is reported but not the sector data.

Table 10-80: First Wholesale Value of Retained Pollock by Sector, CDQ and Non-CDQ Combined, 2003-2007

Sector	Season	2003 Total	2004 Total	2005 Total	2006 Total	2007 Total
CP	A	$261.7	$312.1	$339.7	$321.8	**Conf**
	B	$228.3	$234.2	$306.5	$301.5	**Conf**
Total		**$490.0**	**$546.2**	**$646.3**	**$623.3**	**Conf**
M	A	$42.6	$50.8	$35.3	$56.9	**Conf**
	B	$37.8	$38.2	$29.6	$48.8	**Conf**
Total		**$80.4**	**$89.0**	**$64.9**	**$105.8**	**Conf**
CP+M	A	$304.3	$362.9	$375.0	$378.7	$249.7
	B	$266.1	$272.4	$336.2	$350.4	$250.6
Total		**$570.4**	**$635.3**	**$711.2**	**$729.1**	**$500.3**
S	A	$206.3	$220.9	$262.4	$249.2	$249.7
	B	$249.3	$225.4	$273.6	$268.6	$250.6
Total		**$455.6**	**$446.3**	**$535.9**	**$517.8**	**$500.3**
All	A	$510.6	$583.8	$637.4	$627.9	$614.5
	B	$515.4	$497.8	$609.7	$619.0	$624.4
Total		**$1,026.0**	**$1,081.6**	**$1,247.2**	**$1,246.9**	**$1,238.9**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.
Note: Conf: Confidential due to fewer than three entities reported and/or the reporting of a sector split and the total for the category would violate confidentiality, thus the total is reported but not the sector data.

Table 10-81: Round weight Equivalent First Wholesale value of retained pollock by sector, 2003-2007 ($/mt)

Sector	Season	2003		2004		2005		2006		2007	
		CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ	CDQ	non-CDQ
CP	A	$1,180	$921	$1,126	$1,145	$1,089	$1,284	$1,165	$1,172	Conf	$1,283
	B	$712	$533	$591	$591	$766	$768	$748	$748	Conf	$871
Total		**$899**	**$689**	**$804**	**$818**	**$893**	**$979**	**$915**	**$920**	**Conf**	**$1,035**
M	A	$716	$706	$806	$850	$1,101	$552	$963	$982	Conf	$957
	B	$428	$412	$403	$429	$566	$304	$514	$550	Conf	$660
Total		**$543**	**$529**	**$564**	**$598**	**$777**	**$402**	**$693**	**$720**	**Conf**	**$780**
CP+M	A	$1,116	$880	$1,081	$1,089	$1,090	$1,145	$1,144	$1,136	Conf	$1,217
	B	$672	$509	$565	$559	$745	$675	$723	$709	Conf	$829
Total		**$849**	**$658**	**$771**	**$776**	**$881**	**$866**	**$892**	**$881**	**Conf**	**$984**
S	A	$0	$797	$0	$849	$0	$1,018	$0	$947	0	$1,023
	B	$0	$633	$0	$596	$0	$700	$0	$700	0	$763
Total		**$0**	**$698**	**$0**	**$699**	**$0**	**$827**	**$0**	**$800**	**0**	**$874**
All	A	$1,116	$839	$1,081	$972	$1,090	$1,083	$1,144	$1,043	1,221	$1,120
	B	$672	$570	$565	$577	$745	$688	$723	$704	842	$798
Total		**$849**	**$677**	**$771**	**$738**	**$881**	**$847**	**$892**	**$842**	**994**	**$931**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007, and round weight of retained pollock by sector, season, year, and CDQ vs. non-CDQ from NMFS Alaska Region e-landings catch accounting system.

Note: Conf: Confidential due to fewer than three entities reported and/or the reporting of a sector split and the total for the category would violate confidentiality, thus the total is reported but not the sector data.

Table 10-82: Round Weight Equivalent First Wholesale Value of Retained pollock by Sector, CDQ and Non-CDQ Combined, 2003–2007

Sector	Season	2003 Total	2004 Total	2005 Total	2006 Total	2007 Total
CP	A	$971	$1,141	$1,246	$1,170	**Conf**
	B	$567	$591	$767	$748	**Conf**
Total		**$729**	**$816**	**$962**	**$919**	**Conf**
M	A	$708	$844	$612	$980	**Conf**
	B	$414	$425	$333	$546	**Conf**
Total		**$531**	**$593**	**$443**	**$717**	**Conf**
CP+M	A	$923	$1,088	$1,135	$1,137	**Conf**
	B	$539	$560	$688	$711	**Conf**
Total		**$693**	**$775**	**$869**	**$883**	**Conf**
S	A	$797	$849	$1,018	$947	**$1,023**
	B	$633	$596	$700	$700	**$763**
Total		**$698**	**$699**	**$827**	**$800**	**$874**
All	A	$867	$983	$1,084	$1,053	**$1,131**
	B	$581	$576	$694	$706	**$803**
Total		**$695**	**$742**	**$850**	**$847**	**$938**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007, and round weight of retained pollock by sector, season, year, and CDQ vs. non-CDQ from NMFS Alaska Region e-landings catch accounting system.
Note: Conf: Confidential due to fewer than three entities reported and/or the reporting of a sector split and the total for the category would violate confidentiality, thus the total is reported but not the sector data.

Section 10.5.2.2 Potentially Foregone Gross Revenue under Alternative 2

Table 10-85: 2007 estimated forgone gross revenue by sector for Alternative 2, option 2d (70/30 season split, cap 68,100), compared with PPA1 (cap 68,392) (in millions of $)

Sector		**CDQ**	**Inshore CV**	**Mothership**	**Offshore CP**	**Total**
Alternative 2: option 2d						
	A season	$0.0	$134.8	$20.1	$118.3	$273.2
	B season	$2.5	$40.9	$1.8	$4.2	$49.3
Total Alternative 2		$2.5	$175.7	$21.9	$122.5	$322.5
Alternative 4: PPA1						
	A season	$0	$123	$12	$115	$249
	B season	$4	$36	$2	$22	$64
Total Alternative 4		$4	$159	$14	$137	$313

Table 10-86: 2007 **e**stimated forgone revenue for Alternative 2, option 2d (70/30 season split, cap 48,700) compared with PPA2 (cap 47,591) (in millions of $)

Sector		**CDQ**	**Inshore CV**	**Mothership**	**Offshore CP**	**Total**
Alternative 2: option 2d						
	A season	$23.7	$200.6	$33.7	$155.9	$413.7
	B season	$4.5	$54.7	$3.7	$13.1	$76.0
Total Alternative 2		$28.20	$255.30	$37.40	$169.00	$489.70
Alternative 4: PPA2						
	A season	$13	$154	$28	$172	$367
	B season	$5	$46	$4	$30	$86
Total Alternative 4		$18	$200	$32	$202	$453

Table 10-87: Hypothetical forgone pollock gross revenue, by year and by season, under the Alternative 2 options for fleet-wide caps. ($ Millions)

			2007		
Seas	Cap	Sect	50/50	58/42	70/30
A	87,500	CDQ	$0.0	$0.0	$0.0
		NonCDQ	$346.5	$272.1	$144.8
	87,500 Total		$346.5	$272.1	$144.8
	68,100	CDQ	$10.4	$1.1	$0.0
		NonCDQ	$422.5	$350.6	$274.9
	68,100 Total		$432.9	$351.7	$274.9
	48,700	CDQ	$37.7	$24.1	$10.4
		NonCDQ	$431.0	$427.6	$422.5
	48,700 Total		$468.7	$451.7	$432.9
	29,300	CDQ	$49.8	$49.3	$38.6
		NonCDQ	$518.4	$515.7	$511.6
	29,300 Total		$568.3	$565.0	$550.3
B	87,500	CDQ	$0.0	$0.0	$2.0
		NonCDQ	$13.4	$15.8	$55.8
	87,500 Total		$13.4	$15.8	$57.8
	68,100	CDQ	$0.0	$1.8	$2.3
		NonCDQ	$35.7	$55.1	$74.1
	68,100 Total		$35.7	$57.0	$76.4
	48,700	CDQ	$2.1	$2.3	$4.4
		NonCDQ	$56.3	$74.1	$89.7
	48,700 Total		$58.4	$76.4	$94.1
	29,300	CDQ	$4.4	$4.5	$6.2
		NonCDQ	$89.7	$107.7	$131.2
	29,300 Total		$94.1	$112.3	$137.4

NOTE: The DEIS miscalculated the B season values for 2007 by mistakenly using the A season prices, which are generally higher than B season prices. As a result, the numbers shown here for the B season are smaller than shown in the DEIS because the difference between A and B season prices was greater than the price increases between 2006 and 2007.

Table 10-88: Hypothetical forgone pollock gross revenue in percent of total gross revenue, by year and by season, under the Alternative 2 options for fleet-wide caps.

			2007		
Seas	Cap	Sect	50/50	58/42	70/30
A	87,500	CDQ	0%	0%	0%
		NonCDQ	63%	50%	27%
	87,500 Total		56%	44%	24%
	68,100	CDQ	15%	2%	0%
		NonCDQ	77%	64%	50%
	68,100 Total		70%	57%	45%
	48,700	CDQ	55%	35%	15%
		NonCDQ	79%	78%	77%
	48,700 Total		76%	74%	70%
	29,300	CDQ	73%	72%	57%
		NonCDQ	95%	94%	94%
	29,300 Total		92%	92%	90%
B	87,500	CDQ	0%	0%	3%
		NonCDQ	2%	3%	10%
	87,500 Total		2%	3%	9%
	68,100	CDQ	0%	3%	4%
		NonCDQ	6%	10%	13%
	68,100 Total		6%	9%	13%
	48,700	CDQ	3%	4%	7%
		NonCDQ	10%	13%	16%
	48,700 Total		10%	13%	15%
	29,300	CDQ	7%	7%	9%
		NonCDQ	16%	19%	24%
	29,300 Total		15%	18%	23%

Table 10-97: Hypothetical forgone pollock gross revenue, by season and sector, under Alternative 2, for 2007.

2007			opt1(AFA)			opt2a			opt2d		
Seas	Cap	Sect	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A		CDQ	$0.0	$0.0	$0.0	$39.4	$38.7	$37.7	$9.4	$0.0	$0.0
		M	$19.6	$6.1	$0.0	$33.6	$32.9	$20.0	$26.7	$19.8	$6.1
		P	$115.8	$90.4	$67.1	$156.6	$154.6	$151.5	$152.1	$117.3	$113.9
	87,500	S	$200.5	$168.9	$134.7	$102.6	$2.1	$0.0	$136.7	$133.3	$2.2
	87,500 Total		$336.0	$265.4	$201.7	$332.1	$228.3	$209.2	$324.8	$270.4	$122.2
		CDQ	$0.0	$0.0	$0.0	$50.1	$49.6	$39.0	$23.7	$10.4	$0.0
		M	$32.9	$20.2	$11.5	$34.4	$33.9	$33.2	$33.7	$33.0	$20.1
		P	$152.4	$117.6	$114.2	$189.8	$157.8	$155.4	$155.9	$153.7	$118.3
	68,100	S	$203.7	$201.9	$170.1	$168.0	$134.6	$22.2	$200.6	$169.0	$134.8
	68,100 Total		$389.0	$339.7	$295.8	$442.3	$375.9	$249.8	$413.8	$366.1	$273.2
		CDQ	$10.8	$9.4	$0.0	$51.0	$50.6	$50.1	$38.5	$37.7	$23.7
		M	$34.2	$33.7	$32.9	$43.1	$42.7	$34.4	$42.5	$34.3	$33.7
		P	$157.2	$155.2	$152.3	$236.6	$191.2	$189.8	$190.1	$158.1	$155.9
	48,700	S	$235.1	$233.7	$203.7	$202.5	$200.4	$168.0	$204.7	$203.1	$200.6
	48,700 Total		$437.3	$432.0	$389.0	$533.2	$484.9	$442.3	$475.8	$433.2	$413.7
		CDQ	$38.9	$38.1	$24.4	$59.3	$51.7	$51.3	$50.3	$49.8	$39.3
		M	$43.4	$43.0	$42.5	$44.1	$43.8	$43.5	$43.7	$43.4	$43.0
		P	$236.3	$191.0	$189.6	$240.4	$239.5	$238.1	$238.4	$237.1	$235.3
	29,300	S	$238.6	$237.8	$236.5	$235.7	$234.3	$204.5	$237.1	$236.0	$234.4
	29,300 Total		$557.2	$509.8	$492.9	$579.5	$569.4	$537.4	$569.5	$566.4	$552.0
B		CDQ	$0.0	$0.0	$0.0	$2.5	$4.4	$4.6	$0.0	$1.0	$2.2
		M	$0.0	$0.0	$0.0	$0.0	$0.0	$1.7	$0.0	$0.0	$0.0
		P	$0.0	$0.0	$0.0	$0.0	$0.0	$4.5	$0.0	$0.0	$0.0
	87,500	S	$30.0	$30.7	$40.9	$7.2	$18.5	$30.3	$18.7	$29.7	$40.1
	87,500 Total		$30.0	$30.7	$40.9	$9.7	$22.9	$41.1	$18.7	$30.7	$42.3
		CDQ	$0.0	$0.0	$1.9	$4.5	$4.5	$6.2	$1.0	$2.1	$2.5
		M	$0.0	$0.0	$1.5	$0.0	$1.6	$3.6	$0.0	$0.0	$1.8
		P	$0.0	$0.0	$0.0	$0.0	$0.2	$13.0	$0.0	$0.0	$4.2
	68,100	S	$40.1	$40.6	$54.5	$19.0	$30.0	$40.3	$30.1	$30.7	$40.9
	68,100 Total		$40.1	$40.6	$58.0	$23.5	$36.3	$63.1	$31.1	$32.8	$49.3
		CDQ	$1.0	$1.9	$2.4	$6.2	$6.2	$8.4	$2.3	$2.5	$4.5
		M	$0.0	$1.5	$3.5	$1.8	$3.6	$6.3	$1.5	$1.8	$3.7
		P	$0.0	$0.0	$4.8	$5.0	$13.0	$26.1	$0.0	$4.2	$13.1
	48,700	S	$41.1	$54.5	$65.3	$30.6	$40.3	$46.7	$40.4	$40.9	$54.7
	48,700 Total		$42.0	$58.0	$76.1	$43.5	$63.1	$87.5	$44.2	$49.3	$76.0
		CDQ	$2.4	$4.3	$4.5	$8.4	$8.5	$11.5	$4.5	$4.6	$6.3
		M	$3.5	$3.7	$8.2	$6.3	$8.3	$14.6	$3.7	$6.3	$11.9
		P	$4.8	$12.9	$26.0	$26.1	$32.7	$51.3	$13.1	$19.9	$32.8
	29,300	S	$65.3	$65.6	$66.0	$46.7	$54.7	$65.4	$54.7	$55.0	$65.7
	29300 Total		$76.1	$86.5	$104.7	$87.5	$104.2	$142.8	$76.0	$85.7	$116.7

Table 10-98: Hypothetical forgone pollock revenue in percent of total gross revenue, by season and sector, under Alternative 2, for 2007.

2007			opt1(AFA)			opt2a			opt2d		
Seas	Cap	Sect	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A		CDQ	0%	0%	0%	58%	57%	55%	14%	0%	0%
		M	42%	13%	0%	72%	71%	43%	57%	42%	13%
		P	46%	36%	27%	63%	62%	61%	61%	47%	46%
	87,500	S	80%	68%	54%	41%	1%	0%	55%	53%	1%
	87,500 Total		55%	43%	33%	54%	37%	34%	53%	44%	20%
		CDQ	0%	0%	0%	74%	73%	57%	35%	15%	0%
		M	70%	43%	25%	74%	73%	71%	72%	71%	43%
		P	61%	47%	46%	76%	63%	62%	62%	61%	47%
	68,100	S	82%	81%	68%	67%	54%	9%	80%	68%	54%
	68,100 Total		63%	55%	48%	72%	61%	41%	67%	60%	44%
		CDQ	16%	14%	0%	75%	74%	74%	57%	55%	35%
		M	73%	72%	70%	92%	92%	74%	91%	74%	72%
		P	63%	62%	61%	95%	76%	76%	76%	63%	62%
	48,700	S	94%	94%	82%	81%	80%	67%	82%	81%	80%
	48,700 Total		71%	70%	63%	87%	79%	72%	77%	71%	67%
		CDQ	57%	56%	36%	87%	76%	75%	74%	73%	58%
		M	93%	92%	91%	94%	94%	93%	94%	93%	92%
		P	94%	76%	76%	96%	96%	95%	95%	95%	94%
	29,300	S	96%	95%	95%	94%	94%	82%	95%	95%	94%
	29,300 Total		91%	83%	80%	94%	93%	87%	93%	92%	90%
B		CDQ	0%	0%	0%	4%	6%	7%	0%	1%	3%
		M	0%	0%	0%	0%	0%	4%	0%	0%	0%
		P	0%	0%	0%	0%	0%	2%	0%	0%	0%
	87,500	S	12%	12%	16%	3%	7%	12%	7%	12%	16%
	87,500 Total		5%	5%	7%	2%	4%	7%	3%	5%	7%
		CDQ	0%	0%	3%	6%	6%	9%	1%	3%	4%
		M	0%	0%	3%	0%	3%	8%	0%	0%	4%
		P	0%	0%	0%	0%	0%	5%	0%	0%	2%
	68,100	S	16%	16%	22%	8%	12%	16%	12%	12%	16%
	68,100 Total		6%	7%	9%	4%	6%	10%	5%	5%	8%
		CDQ	1%	3%	3%	9%	9%	12%	3%	4%	6%
		M	0%	3%	7%	4%	8%	13%	3%	4%	8%
		P	0%	0%	2%	2%	5%	10%	0%	2%	5%
	48,700	S	16%	22%	26%	12%	16%	19%	16%	16%	22%
	48,700 Total		7%	9%	12%	7%	10%	14%	7%	8%	12%
		CDQ	3%	6%	6%	12%	12%	16%	6%	7%	9%
		M	7%	8%	17%	13%	17%	30%	8%	13%	25%
		P	2%	5%	10%	10%	13%	20%	5%	8%	13%
	29,300	S	26%	26%	26%	19%	22%	26%	22%	22%	26%
	29300 Total		12%	14%	17%	14%	17%	23%	12%	14%	19%

10.5.2.3 Potentially Foregone Gross Revenue under Alternative 4

Table 10-99:ypothetical forgone pollock revenue by year and season under PPA1 and PPA2.
($ Millions)

PPA	A-season Transfer-Ability	Year	A-Season CDQ	A-Season M	A-Season P	A-Season S	**A total**	A-B Roll over	B-Season CDQ	B-Season M	B-Season P	B-Season S	**B Total**	**Annual Total**
1	No	2003	$0	$0	$0	$0	**$0**	0%	$0	$0	$0	$0	**$0**	**$0**
		2004	$0	$0	$0	$0	**$0**		$9	$0	$0	$10	**$20**	**$20**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$0	$20	**$20**	**$20**
		2006	$0	$8	$8	$122	**$138**		$0	$0	$0	$11	**$11**	**$149**
		2007	$0	$15	$115	$123	**$252**		$4	$2	$22	$36	**$64**	**$317**
	Yes	2003	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2004	$0	$0	$0	$0	**$0**		$9	$0	$0	$10	**$20**	**$20**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$0	$20	**$20**	**$20**
		2006	$0	$4	$0	$116	**$120**		$0	$0	$0	$11	**$11**	**$131**
		2007	$0	$12	$115	$123	**$249**		$4	$2	$22	$36	**$64**	**$314**
2	No	2003	$0	$0	$56	$0	**$56**		$0	$1	$0	$0	**$1**	**$57**
		2004	$0	$0	$0	$0	**$0**		$21	$1	$1	$18	**$41**	**$41**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$29	$27	**$57**	**$57**
		2006	$0	$15	$60	$169	**$244**		$0	$0	$0	$27	**$27**	**$272**
		2007	$13	$28	$154	$172	**$367**		$5	$4	$30	$46	**$86**	**$452**
	Yes	2003	$0	$0	$22	$0	**$22**		$0	$1	$0	$0	**$1**	**$22**
		2004	$0	$0	$0	$0	**$0**		$21	$1	$1	$18	**$41**	**$41**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$29	$27	**$57**	**$57**
		2006	$0	$15	$39	$162	**$216**		$0	$0	$0	$27	**$27**	**$243**
		2007	$13	$28	$154	$172	**$367**		$5	$4	$30	$46	**$86**	**$452**
1	No	2003	$0	$0	$0	$0	**$0**	80%	$0	$0	$0	$0	**$0**	**$0**
		2004	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2006	$0	$8	$8	$122	**$138**		$0	$0	$0	$9	**$9**	**$147**
		2007	$0	$15	$115	$123	**$252**		$4	$2	$20	$36	**$62**	**$315**
	Yes	2003	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2004	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$0	$0	**$0**	**$0**
		2006	$0	$4	$0	$116	**$120**		$0	$0	$0	$9	**$9**	**$129**
		2007	$0	$12	$115	$123	**$249**		$4	$2	$20	$36	**$62**	**$312**
2	No	2003	$0	$0	$56	$0	**$56**		$0	$0	$0	$0	**$0**	**$56**
		2004	$0	$0	$0	$0	**$0**		$0	$0	$0	$10	**$10**	**$10**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$8	$21	**$29**	**$29**
		2006	$0	$15	$60	$169	**$244**		$0	$0	$0	$27	**$27**	**$272**
		2007	$13	$28	$154	$172	**$367**		$5	$4	$30	$46	**$86**	**$452**
	Yes	2003	$0	$0	$22	$0	**$22**		$0	$1	$0	$0	**$1**	**$22**
		2004	$0	$0	$0	$0	**$0**		$0	$0	$0	$10	**$10**	**$10**
		2005	$0	$0	$0	$0	**$0**		$0	$0	$8	$21	**$29**	**$29**
		2006	$0	$15	$39	$162	**$216**		$0	$0	$0	$27	**$27**	**$243**
		2007	$13	$28	$154	$172	**$367**		$5	$4	$30	$46	**$86**	**$452**

Table 10-100: Hypothetical forgone pollock revenue, in percent of total forgone pollock revenue, by sector and scenario (% of total wholesale revenue)

PPA	A-season Transfer-Ability	Year	A-Season CDQ	A-Season M	A-Season P	A-Season S	**A total**	A-B Roll over	B-Season CDQ	B-Season M	B-Season P	B-Season S	**B Total**	**Annual Total**
1	No	2003	0%	0%	0%	0%	**0%**	**0%**	0%	0%	0%	0%	**0%**	**0%**
		2004	0%	0%	0%	0%	**0%**		18%	1%	0%	4%	**4%**	**2%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	0%	7%	**3%**	**2%**
		2006	0%	16%	3%	49%	**22%**		0%	0%	0%	4%	**2%**	**12%**
		2007	0%	31%	46%	49%	**41%**		6%	4%	9%	14%	**10%**	**26%**
	Yes	2003	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2004	0%	0%	0%	0%	**0%**		18%	1%	0%	4%	**4%**	**2%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	0%	7%	**3%**	**2%**
		2006	0%	8%	0%	47%	**19%**		0%	0%	0%	4%	**2%**	**10%**
		2007	0%	25%	46%	49%	**41%**		6%	4%	9%	14%	**10%**	**25%**
2	No	2003	0%	0%	28%	0%	**11%**		0%	2%	0%	0%	**0%**	**6%**
		2004	0%	0%	0%	0%	**0%**		41%	4%	0%	8%	**8%**	**4%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	12%	10%	**9%**	**5%**
		2006	0%	30%	23%	68%	**39%**		0%	0%	0%	10%	**4%**	**22%**
		2007	18%	60%	61%	69%	**60%**		7%	8%	12%	18%	**14%**	**37%**
	Yes	2003	0%	0%	11%	0%	**4%**		0%	2%	0%	0%	**0%**	**2%**
		2004	0%	0%	0%	0%	**0%**		41%	4%	0%	8%	**8%**	**4%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	12%	10%	**9%**	**5%**
		2006	0%	30%	15%	65%	**34%**		0%	0%	0%	10%	**4%**	**19%**
		2007	18%	60%	61%	69%	**60%**		7%	8%	12%	18%	**14%**	**37%**
1	No	2003	0%	0%	0%	0%	**0%**	**80%**	0%	0%	0%	0%	**0%**	**0%**
		2004	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2006	0%	16%	3%	49%	**22%**		0%	0%	0%	3%	**1%**	**12%**
		2007	0%	31%	46%	49%	**41%**		5%	4%	8%	14%	**10%**	**25%**
	Yes	2003	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2004	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	0%	0%	**0%**	**0%**
		2006	0%	8%	0%	47%	**19%**		0%	0%	0%	3%	**1%**	**10%**
		2007	0%	25%	46%	49%	**41%**		5%	4%	8%	14%	**10%**	**25%**
2	No	2003	0%	0%	28%	0%	**11%**		0%	0%	0%	0%	**0%**	**5%**
		2004	0%	0%	0%	0%	**0%**		0%	0%	0%	4%	**2%**	**1%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	3%	8%	**5%**	**2%**
		2006	0%	30%	23%	68%	**39%**		0%	0%	0%	10%	**4%**	**22%**
		2007	18%	60%	61%	69%	**60%**		7%	8%	12%	18%	**14%**	**37%**
	Yes	2003	0%	0%	11%	0%	**4%**		0%	2%	0%	0%	**0%**	**2%**
		2004	0%	0%	0%	0%	**0%**		0%	0%	0%	4%	**2%**	**1%**
		2005	0%	0%	0%	0%	**0%**		0%	0%	3%	8%	**5%**	**2%**
		2006	0%	30%	15%	65%	**34%**		0%	0%	0%	10%	**4%**	**19%**
		2007	18%	60%	61%	69%	**60%**		7%	8%	12%	18%	**14%**	**37%**

10.5.2.4 Revenue at Risk under Alternative 3

Table 10-106: Hypothetical Revenue At Risk (millions of dollars (upper) percent of total revenue (lower)) based on retained tons of pollock caught by all vessels after A-season closures would have been triggered.

Pollock			Sector (All), A season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	61,250	$0.0	$0.0	$0.0	$0.0	$134.4
	1-2: 58/42	50,750	$0.0	$0.0	$0.0	$77.5	$282.5
	1-3: 55/45	48,125	$0.0	$0.0	$0.0	$157.0	$289.7
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$234.9	$301.1
68,100	1-1: 70/30	47,670	$0.0	$0.0	$0.0	$168.1	$289.7
	1-2: 58/42	39,498	$0.0	$0.0	$0.0	$265.8	$337.4
	1-3: 55/45	37,455	$0.0	$0.0	$0.0	$276.1	$350.3
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$300.1	$369.9
48,700	1-1: 70/30	34,090	$0.0	$0.0	$0.0	$300.1	$369.9
	1-2: 58/42	28,246	$92.3	$0.0	$0.0	$376.9	$413.9
	1-3: 55/45	26,785	$108.3	$0.0	$40.6	$376.9	$423.7
	1-4: 50/50	24,350	$141.0	$0.0	$151.5	$399.8	$442.9
29,300	1-1: 70/30	20,510	$241.5	$65.4	$232.1	$432.8	$486.2
	1-2: 58/42	16,994	$266.0	$129.3	$320.5	$442.6	$520.2
	1-3: 55/45	16,115	$272.1	$137.9	$338.7	$442.6	$520.2
	1-4: 50/50	14,650	$285.2	$179.2	$350.5	$442.6	$520.2
Pollock			**Sector (All), A season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	0%	0%	0%	0%	22%
	1-2: 58/42	50,750	0%	0%	0%	12%	46%
	1-3: 55/45	48,125	0%	0%	0%	25%	47%
	1-4: 50/50	43,750	0%	0%	0%	37%	49%
68,100	1-1: 70/30	47,670	0%	0%	0%	27%	47%
	1-2: 58/42	39,498	0%	0%	0%	42%	55%
	1-3: 55/45	37,455	0%	0%	0%	44%	57%
	1-4: 50/50	34,050	0%	0%	0%	48%	60%
48,700	1-1: 70/30	34,090	0%	0%	0%	48%	60%
	1-2: 58/42	28,246	18%	0%	0%	60%	67%
	1-3: 55/45	26,785	21%	0%	6%	60%	69%
	1-4: 50/50	24,350	28%	0%	24%	64%	72%
29,300	1-1: 70/30	20,510	47%	11%	36%	69%	79%
	1-2: 58/42	16,994	52%	22%	50%	70%	85%
	1-3: 55/45	16,115	53%	24%	53%	70%	85%
	1-4: 50/50	14,650	56%	31%	55%	70%	85%

Table 10-107: Hypothetical Revenue At Risk based on retained tons of pollock caught by catcher/ processors after A-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			CPs, A season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	61,250	$0.0	$0.0	$0.0	$0.0	$73.6
	1-2: 58/42	50,750	$0.0	$0.0	$0.0	$38.0	$147.3
	1-3: 55/45	48,125	$0.0	$0.0	$0.0	$86.8	$151.1
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$119.9	$155.7
68,100	1-1: 70/30	47,670	$0.0	$0.0	$0.0	$91.5	$151.1
	1-2: 58/42	39,498	$0.0	$0.0	$0.0	$134.1	$170.7
	1-3: 55/45	37,455	$0.0	$0.0	$0.0	$139.5	$176.7
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$148.7	$187.2
48,700	1-1: 70/30	34,090	$0.0	$0.0	$0.0	$148.7	$187.2
	1-2: 58/42	28,246	$59.8	$0.0	$0.0	$187.9	$210.0
	1-3: 55/45	26,785	$67.7	$0.0	$15.2	$187.9	$218.1
	1-4: 50/50	24,350	$84.3	$0.0	$78.9	$196.7	$230.7
29,300	1-1: 70/30	20,510	$138.3	$33.2	$119.3	$213.2	$247.1
	1-2: 58/42	16,994	$149.0	$71.1	$167.3	$219.2	$263.4
	1-3: 55/45	16,115	$152.1	$74.6	$177.6	$219.2	$263.4
	1-4: 50/50	14,650	$157.7	$97.3	$183.7	$219.2	$263.4
Pollock			**CPs, A season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	0%	0%	0%	0%	24%
	1-2: 58/42	50,750	0%	0%	0%	12%	47%
	1-3: 55/45	48,125	0%	0%	0%	27%	49%
	1-4: 50/50	43,750	0%	0%	0%	37%	50%
68,100	1-1: 70/30	47,670	0%	0%	0%	28%	49%
	1-2: 58/42	39,498	0%	0%	0%	42%	55%
	1-3: 55/45	37,455	0%	0%	0%	43%	57%
	1-4: 50/50	34,050	0%	0%	0%	46%	60%
48,700	1-1: 70/30	34,090	0%	0%	0%	46%	60%
	1-2: 58/42	28,246	23%	0%	0%	58%	68%
	1-3: 55/45	26,785	26%	0%	4%	58%	70%
	1-4: 50/50	24,350	32%	0%	23%	61%	74%
29,300	1-1: 70/30	20,510	53%	11%	35%	66%	80%
	1-2: 58/42	16,994	57%	23%	49%	68%	85%
	1-3: 55/45	16,115	58%	24%	52%	68%	85%
	1-4: 50/50	14,650	60%	31%	54%	68%	85%

Table 10-108: Hypothetical Revenue At Risk based on Retained tons of pollock caught by Inshore Catcher Vessels after A-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			Inshore catcher vessels, A season				
Cap scenario	**Option**	CAP	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	$0.0	$0.0	$0.0	$0.0	$54.1
	1-2: 58/42	50,750	$0.0	$0.0	$0.0	$34.7	$115.8
	1-3: 55/45	48,125	$0.0	$0.0	$0.0	$63.2	$117.8
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$100.0	$123.0
68,100	1-1: 70/30	47,670	$0.0	$0.0	$0.0	$68.7	$117.8
	1-2: 58/42	39,498	$0.0	$0.0	$0.0	$112.4	$139.3
	1-3: 55/45	37,455	$0.0	$0.0	$0.0	$116.0	$145.4
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$127.3	$153.6
48,700	1-1: 70/30	34,090	$0.0	$0.0	$0.0	$127.3	$153.6
	1-2: 58/42	28,246	$29.8	$0.0	$0.0	$158.7	$172.4
	1-3: 55/45	26,785	$37.4	$0.0	$24.9	$158.7	$173.9
	1-4: 50/50	24,350	$51.5	$0.0	$68.3	$169.5	$179.3
29,300	1-1: 70/30	20,510	$91.5	$28.9	$104.7	$182.2	$201.0
	1-2: 58/42	16,994	$103.5	$52.3	$139.2	$186.1	$215.5
	1-3: 55/45	16,115	$106.1	$56.4	$145.8	$186.1	$215.5
	1-4: 50/50	14,650	$113.2	$71.6	$151.0	$186.1	$215.5
Pollock			**Inshore catcher vessels, A season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	0%	0%	0%	0%	22%
	1-2: 58/42	50,750	0%	0%	0%	14%	46%
	1-3: 55/45	48,125	0%	0%	0%	25%	47%
	1-4: 50/50	43,750	0%	0%	0%	40%	49%
68,100	1-1: 70/30	47,670	0%	0%	0%	28%	47%
	1-2: 58/42	39,498	0%	0%	0%	45%	56%
	1-3: 55/45	37,455	0%	0%	0%	47%	58%
	1-4: 50/50	34,050	0%	0%	0%	51%	62%
48,700	1-1: 70/30	34,090	0%	0%	0%	51%	62%
	1-2: 58/42	28,246	14%	0%	0%	64%	69%
	1-3: 55/45	26,785	18%	0%	10%	64%	70%
	1-4: 50/50	24,350	25%	0%	26%	68%	72%
29,300	1-1: 70/30	20,510	44%	13%	40%	73%	80%
	1-2: 58/42	16,994	50%	24%	53%	75%	86%
	1-3: 55/45	16,115	51%	26%	56%	75%	86%
	1-4: 50/50	14,650	55%	32%	58%	75%	86%

Table 10-109: Hypothetical Revenue At Risk based on retained tons of pollock caught by Mothership Processors after A-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			Mothership operations, A season				
Cap scenario	**Option**	CAP	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	$0.0	$0.0	$0.0	$0.0	$8.2
	1-2: 58/42	50,750	$0.0	$0.0	$0.0	$4.3	$20.9
	1-3: 55/45	48,125	$0.0	$0.0	$0.0	$8.0	$22.3
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$14.8	$23.7
68,100	1-1: 70/30	47,670	$0.0	$0.0	$0.0	$8.7	$22.3
	1-2: 58/42	39,498	$0.0	$0.0	$0.0	$18.7	$28.0
	1-3: 55/45	37,455	$0.0	$0.0	$0.0	$20.1	$28.7
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$23.0	$29.7
48,700	1-1: 70/30	34,090	$0.0	$0.0	$0.0	$23.0	$29.7
	1-2: 58/42	28,246	$5.2	$0.0	$0.0	$29.1	$32.4
	1-3: 55/45	26,785	$5.8	$0.0	$0.5	$29.1	$33.3
	1-4: 50/50	24,350	$7.9	$0.0	$5.7	$31.9	$35.9
29,300	1-1: 70/30	20,510	$14.9	$2.9	$9.6	$35.6	$39.2
	1-2: 58/42	16,994	$16.5	$6.5	$15.1	$35.7	$42.3
	1-3: 55/45	16,115	$16.9	$7.2	$16.3	$35.7	$42.3
	1-4: 50/50	14,650	$17.2	$10.8	$16.9	$35.7	$42.3

Pollock			Mothership operations, A season				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	61,250	0%	0%	0%	0%	15%
	1-2: 58/42	50,750	0%	0%	0%	8%	39%
	1-3: 55/45	48,125	0%	0%	0%	14%	41%
	1-4: 50/50	43,750	0%	0%	0%	26%	44%
68,100	1-1: 70/30	47,670	0%	0%	0%	15%	41%
	1-2: 58/42	39,498	0%	0%	0%	33%	52%
	1-3: 55/45	37,455	0%	0%	0%	35%	53%
	1-4: 50/50	34,050	0%	0%	0%	40%	55%
48,700	1-1: 70/30	34,090	0%	0%	0%	40%	55%
	1-2: 58/42	28,246	12%	0%	0%	51%	60%
	1-3: 55/45	26,785	14%	0%	1%	51%	62%
	1-4: 50/50	24,350	19%	0%	16%	56%	66%
29,300	1-1: 70/30	20,510	35%	6%	27%	63%	72%
	1-2: 58/42	16,994	39%	13%	43%	63%	78%
	1-3: 55/45	16,115	40%	14%	46%	63%	78%
	1-4: 50/50	14,650	40%	21%	48%	63%	78%

Table 10-110: Hypothetical Revenue At Risk (millions of dollars (upper) percent of total revenue (lower)) based on retained tons of pollock caught by all vessels after B-season closures would have been triggered.

Pollock			Sector (All), B season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	26,250	$0.0	$3.1	$15.8	$0.0	$57.0
	1-2: 58/42	36,750	$0.0	$0.0	$0.4	$0.0	$17.2
	1-3: 55/45	39,375	$0.0	$0.0	$0.0	$0.0	$12.1
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$0.0	$2.1
68,100	1-1: 70/30	20,430	$0.0	$11.7	$24.2	$14.4	$67.7
	1-2: 58/42	28,602	$0.0	$1.2	$9.9	$0.0	$48.2
	1-3: 55/45	30,645	$0.0	$0.0	$6.7	$0.0	$42.8
	1-4: 50/50	34,050	$0.0	$0.0	$1.5	$0.0	$25.0
48,700	1-1: 70/30	14,610	$0.0	$22.7	$35.2	$40.6	$89.7
	1-2: 58/42	20,454	$0.0	$11.7	$24.2	$14.4	$67.7
	1-3: 55/45	21,915	$0.0	$9.1	$22.6	$7.2	$64.8
	1-4: 50/50	24,350	$0.0	$4.8	$19.2	$0.0	$62.0
29,300	1-1: 70/30	8,790	$16.1	$79.8	$104.9	$117.3	$122.8
	1-2: 58/42	12,306	$7.1	$34.5	$54.4	$68.0	$104.0
	1-3: 55/45	13,185	$0.0	$23.7	$48.2	$61.7	$94.4
	1-4: 50/50	14,650	$0.0	$22.7	$35.2	$40.6	$89.7
Pollock			**Sector (All), B season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	26,250	0%	1%	3%	0%	9%
	1-2: 58/42	36,750	0%	0%	0%	0%	3%
	1-3: 55/45	39,375	0%	0%	0%	0%	2%
	1-4: 50/50	43,750	0%	0%	0%	0%	0%
68,100	1-1: 70/30	20,430	0%	2%	4%	2%	11%
	1-2: 58/42	28,602	0%	0%	2%	0%	8%
	1-3: 55/45	30,645	0%	0%	1%	0%	7%
	1-4: 50/50	34,050	0%	0%	0%	0%	4%
48,700	1-1: 70/30	14,610	0%	5%	6%	7%	14%
	1-2: 58/42	20,454	0%	2%	4%	2%	11%
	1-3: 55/45	21,915	0%	2%	4%	1%	10%
	1-4: 50/50	24,350	0%	1%	3%	0%	10%
29,300	1-1: 70/30	8,790	3%	16%	17%	19%	20%
	1-2: 58/42	12,306	1%	7%	9%	11%	17%
	1-3: 55/45	13,185	0%	5%	8%	10%	15%
	1-4: 50/50	14,650	0%	5%	6%	7%	14%

Table 10-111: Hypothetical Revenue At Risk based on retained tons of pollock caught by catcher/processors after B-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			CPs, B season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	26,250	$0.0	$0.0	$0.0	$0.0	$19.8
	1-2: 58/42	36,750	$0.0	$0.0	$0.0	$0.0	$5.9
	1-3: 55/45	39,375	$0.0	$0.0	$0.0	$0.0	$3.6
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$0.0	$0.3
68,100	1-1: 70/30	20,430	$0.0	$0.0	$0.0	$0.7	$23.0
	1-2: 58/42	28,602	$0.0	$0.0	$0.0	$0.0	$17.1
	1-3: 55/45	30,645	$0.0	$0.0	$0.0	$0.0	$15.5
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$0.0	$8.8
48,700	1-1: 70/30	14,610	$0.0	$1.6	$2.4	$9.6	$32.8
	1-2: 58/42	20,454	$0.0	$0.0	$0.0	$0.7	$23.0
	1-3: 55/45	21,915	$0.0	$0.0	$0.0	$0.0	$22.1
	1-4: 50/50	24,350	$0.0	$0.0	$0.0	$0.0	$21.2
29,300	1-1: 70/30	8,790	$1.0	$25.4	$37.5	$41.6	$47.2
	1-2: 58/42	12,306	$0.0	$6.8	$11.0	$22.4	$39.0
	1-3: 55/45	13,185	$0.0	$1.9	$9.1	$19.0	$34.7
	1-4: 50/50	14,650	$0.0	$1.6	$2.4	$9.6	$32.8
Pollock			**CPs, B season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	26,250	0%	0%	0%	0%	8%
	1-2: 58/42	36,750	0%	0%	0%	0%	2%
	1-3: 55/45	39,375	0%	0%	0%	0%	1%
	1-4: 50/50	43,750	0%	0%	0%	0%	0%
68,100	1-1: 70/30	20,430	0%	0%	0%	0%	9%
	1-2: 58/42	28,602	0%	0%	0%	0%	7%
	1-3: 55/45	30,645	0%	0%	0%	0%	6%
	1-4: 50/50	34,050	0%	0%	0%	0%	3%
48,700	1-1: 70/30	14,610	0%	1%	1%	3%	13%
	1-2: 58/42	20,454	0%	0%	0%	0%	9%
	1-3: 55/45	21,915	0%	0%	0%	0%	9%
	1-4: 50/50	24,350	0%	0%	0%	0%	8%
29,300	1-1: 70/30	8,790	0%	11%	12%	14%	18%
	1-2: 58/42	12,306	0%	3%	4%	7%	15%
	1-3: 55/45	13,185	0%	1%	3%	6%	14%
	1-4: 50/50	14,650	0%	1%	1%	3%	13%

Table 10-112: Hypothetical Revenue At Risk based on retained tons of pollock caught by Inshore Catcher Vessels after B-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			Inshore catcher vessels, B season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	26,250	$0.0	$1.9	$13.5	$0.0	$28.7
	1-2: 58/42	36,750	$0.0	$0.0	$0.5	$0.0	$7.8
	1-3: 55/45	39,375	$0.0	$0.0	$0.0	$0.0	$5.8
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$0.0	$0.9
68,100	1-1: 70/30	20,430	$0.0	$10.1	$20.2	$10.6	$34.7
	1-2: 58/42	28,602	$0.0	$0.6	$9.1	$0.0	$23.2
	1-3: 55/45	30,645	$0.0	$0.0	$6.8	$0.0	$20.2
	1-4: 50/50	34,050	$0.0	$0.0	$1.5	$0.0	$12.0
48,700	1-1: 70/30	14,610	$0.0	$19.3	$29.0	$26.0	$44.1
	1-2: 58/42	20,454	$0.0	$10.1	$20.2	$10.6	$34.7
	1-3: 55/45	21,915	$0.0	$7.5	$19.1	$5.4	$33.5
	1-4: 50/50	24,350	$0.0	$3.2	$16.3	$0.0	$31.9
29,300	1-1: 70/30	8,790	$14.1	$41.5	$60.3	$64.7	$57.3
	1-2: 58/42	12,306	$6.4	$21.6	$39.3	$38.6	$48.9
	1-3: 55/45	13,185	$0.0	$19.5	$35.3	$36.0	$46.1
	1-4: 50/50	14,650	$0.0	$19.3	$29.0	$26.0	$44.1
Pollock			**Inshore catcher vessels, B season**				
Cap scenario	**Option**	**CAP**	**2003**	**2004**	**2005**	**2006**	**2007**
87,500	1-1: 70/30	26,250	0%	1%	5%	0%	11%
	1-2: 58/42	36,750	0%	0%	0%	0%	3%
	1-3: 55/45	39,375	0%	0%	0%	0%	2%
	1-4: 50/50	43,750	0%	0%	0%	0%	0%
68,100	1-1: 70/30	20,430	0%	4%	7%	4%	14%
	1-2: 58/42	28,602	0%	0%	3%	0%	9%
	1-3: 55/45	30,645	0%	0%	2%	0%	8%
	1-4: 50/50	34,050	0%	0%	1%	0%	5%
48,700	1-1: 70/30	14,610	0%	9%	11%	10%	18%
	1-2: 58/42	20,454	0%	4%	7%	4%	14%
	1-3: 55/45	21,915	0%	3%	7%	2%	13%
	1-4: 50/50	24,350	0%	1%	6%	0%	13%
29,300	1-1: 70/30	8,790	6%	18%	22%	24%	23%
	1-2: 58/42	12,306	3%	10%	14%	14%	20%
	1-3: 55/45	13,185	0%	9%	13%	13%	18%
	1-4: 50/50	14,650	0%	9%	11%	10%	18%

Table 10-113: Hypothetical Revenue At Risk based on Retained tons of pollock caught by Mothership Processors after A-season closures would have been triggered (millions of dollars (upper) percent of total revenue (lower)).

Pollock			Mothership operations, B season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	26,250	$0.0	$1.0	$1.2	$0.0	$7.1
	1-2: 58/42	36,750	$0.0	$0.0	$0.0	$0.0	$2.9
	1-3: 55/45	39,375	$0.0	$0.0	$0.0	$0.0	$2.2
	1-4: 50/50	43,750	$0.0	$0.0	$0.0	$0.0	$0.7
68,100	1-1: 70/30	20,430	$0.0	$2.8	$3.7	$4.1	$8.2
	1-2: 58/42	28,602	$0.0	$1.0	$0.8	$0.0	$6.6
	1-3: 55/45	30,645	$0.0	$0.0	$0.0	$0.0	$5.9
	1-4: 50/50	34,050	$0.0	$0.0	$0.0	$0.0	$3.5
48,700	1-1: 70/30	14,610	$0.0	$3.7	$3.7	$7.5	$10.8
	1-2: 58/42	20,454	$0.0	$2.8	$3.7	$4.1	$8.2
	1-3: 55/45	21,915	$0.0	$2.7	$3.3	$2.3	$7.6
	1-4: 50/50	24,350	$0.0	$2.4	$2.7	$0.0	$7.3
29,300	1-1: 70/30	8,790	$2.6	$21.9	$9.9	$17.5	$15.6
	1-2: 58/42	12,306	$1.5	$10.2	$4.9	$11.1	$13.7
	1-3: 55/45	13,185	$0.0	$4.5	$4.5	$10.3	$11.5
	1-4: 50/50	14,650	$0.0	$3.7	$3.7	$7.5	$10.8

Pollock			Mothership operations, B season				
Cap scenario	Option	CAP	2003	2004	2005	2006	2007
87,500	1-1: 70/30	26,250	0%	2%	4%	0%	12%
	1-2: 58/42	36,750	0%	0%	0%	0%	9%
	1-3: 55/45	39,375	0%	0%	0%	0%	7%
	1-4: 50/50	43,750	0%	0%	0%	0%	2%
68,100	1-1: 70/30	20,430	0%	7%	12%	8%	25%
	1-2: 58/42	28,602	0%	3%	3%	0%	20%
	1-3: 55/45	30,645	0%	0%	0%	0%	18%
	1-4: 50/50	34,050	0%	0%	0%	0%	11%
48,700	1-1: 70/30	14,610	0%	10%	13%	15%	33%
	1-2: 58/42	20,454	0%	7%	12%	8%	25%
	1-3: 55/45	21,915	0%	7%	11%	5%	23%
	1-4: 50/50	24,350	0%	6%	9%	0%	22%
29,300	1-1: 70/30	8,790	7%	57%	34%	36%	47%
	1-2: 58/42	12,306	4%	27%	16%	23%	42%
	1-3: 55/45	13,185	0%	12%	15%	21%	35%
	1-4: 50/50	14,650	0%	10%	13%	15%	33%

10.5.6.1 Potential Forgone State and Local Tax Revenue under Alternative 2

Table 10-114: Hypothetical forgone pollock state tax revenue under the Alternative 2 fleet-wide cap levels.

2003			
Cap	50/50	58/42	70/30
87,500	$0	$0	$0
68,100	$22,822	$0	$0
48,700	$1,390,051	$984,659	$22,551
29,300	$2,588,850	$2,095,675	$2,090,633
2004			
Cap	50/50	58/42	70/30
87,500	$0	$0	$20,037
68,100	$0	$6,072	$111,110
48,700	$51,057	$111,004	$315,645
29,300	$1,444,205	$1,465,423	$1,295,830
2005			
Cap	50/50	58/42	70/30
87,500	$0	$20,711	$299,903
68,100	$79,187	$141,158	$261,730
48,700	$1,271,194	$262,367	$601,543
29,300	$3,501,746	$3,124,620	$2,761,402
2006			
Cap	50/50	58/42	70/30
87,500	$3,395,290	$2,169,862	$20,814
68,100	$2,363,528	$1,705,486	$1,761,431
48,700	$3,086,755	$3,167,343	$2,879,551
29,300	$4,553,396	$3,782,593	$4,188,643
2007			
Cap	50/50	58/42	70/30
87,500	$6,198,274	$4,958,475	$3,489,429
68,100	$3,947,526	$3,442,470	$2,959,165
48,700	$4,439,726	$4,448,058	$4,439,072
29,300	$5,579,120	$5,704,230	$5,792,389

10.5.6.2 Potential Forgone State and Local Tax Revenues under Alternative 4

Table 10-115: Hypothetical forgone pollock state tax revenue under Chinook bycatch options under PPA1 and PPA2.

PPA	A-season Transferability	Year	A-B Rollover	Annual Total	A/P Tax Impact
1	No	2003	0%	0%	$0
		2004		2%	$173,346
		2005		2%	$175,671
		2006		12%	$1,346,659
		2007		26%	$2,685,310
	Yes	2003		0%	$0
		2004		2%	$173,346
		2005		2%	$175,671
		2006		10%	$1,183,035
		2007		25%	$2,659,598
2	No	2003		6%	$512,115
		2004		4%	$362,425
		2005		5%	$492,139
		2006		22%	$2,455,520
		2007		37%	$3,835,410
	Yes	2003		2%	$201,303
		2004		4%	$362,425
		2005		5%	$492,139
		2006		19%	$2,196,496
		2007		37%	$3,835,410
1	No	2003	80%	0%	$0
		2004		0%	$0
		2005		0%	$3,942
		2006		12%	$1,330,376
		2007		25%	$2,668,472
	Yes	2003		0%	$0
		2004		0%	$0
		2005		0%	$3,942
		2006		10%	$1,166,752
		2007		25%	$2,642,759
2	No	2003		5%	$506,762
		2004		1%	$89,332
		2005		2%	$249,970
		2006		22%	$2,455,520
		2007		37%	$3,834,257
	Yes	2003		2%	$201,303
		2004		1%	$89,332
		2005		2%	$249,970
		2006		19%	$2,196,496
		2007		37%	$3,834,257

Table 10-116: Hypothetical forgone pollock state tax revenue under Chinook salmon bycatch options for triggered closures.

Pollock Cap scenario	Option	All Sectors All State Pollock Tax Impact Annual Totals 2003	2004	2005	2006	2007
87,500	1-1: 70/30	$0	$27,320	$137,593	$0	$1,611,937
	1-2: 58/42	$0	$0	$3,904	$701,026	$2,524,344
	1-3: 55/45	$0	$0	$0	$1,419,664	$2,541,925
	1-4: 50/50	$0	$0	$0	$2,124,681	$2,553,787
68,100	1-1: 70/30	$0	$103,457	$210,236	$1,650,185	$3,010,121
	1-2: 58/42	$0	$10,948	$86,109	$2,404,015	$3,248,183
	1-3: 55/45	$0	$0	$58,400	$2,497,216	$3,311,109
	1-4: 50/50	$0	$0	$13,050	$2,713,562	$3,326,158
48,700	1-1: 70/30	$0	$200,124	$305,527	$3,081,129	$3,871,281
	1-2: 58/42	$829,678	$103,457	$210,236	$3,538,203	$4,056,537
	1-3: 55/45	$973,458	$80,194	$549,656	$3,473,050	$4,114,558
	1-4: 50/50	$1,267,004	$42,011	$1,482,947	$3,615,505	$4,252,444
29,300	1-1: 70/30	$2,314,688	$1,279,847	$2,927,657	$4,974,637	$5,129,486
	1-2: 58/42	$2,454,887	$1,444,376	$3,257,130	$4,617,237	$5,258,337
	1-3: 55/45	$2,444,996	$1,424,992	$3,360,936	$4,560,375	$5,177,422
	1-4: 50/50	$2,562,989	$1,780,214	$3,350,047	$4,369,846	$5,137,816

Appendix 11 – New CDQ section

COMMUNITY DEVELOPMENT QUOTA (CDQ) PROGRAM

This draft CDQ section combines section 3.4.4.2 (pg 153) and 9.4.8 (pg 462) in the DEIS/RIR/IRFA and provides updated and expanded descriptive information about the CDQ Program. Revisions also are made to the analysis of the impacts of the alternatives on the CDQ Program by adding estimates of foregone pollock CDQ royalties to the existing estimates of foregone gross revenues for the CDQ sector in section 10.5.2 (pg 652).

A portion of the Federal pollock TAC in the BSAI is allocated for harvest by participants in the CDQ Program[33]. The CDQ Program was designed to improve the social and economic conditions in western Alaska communities by facilitating their economic participation in the BSAI fisheries. The large-scale commercial fisheries of the BSAI developed in the eastern Bering Sea without significant participation from rural western Alaska communities. These fisheries are capital-intensive and require large investments in vessels, infrastructure, processing capacity, and specialized gear. The CDQ Program was developed to redistribute some of the BSAI fisheries' economic benefits to adjacent communities by allocating a portion of commercially important BSAI species including pollock, crab, halibut, and various groundfish, to such communities. The percentage of each annual BSAI catch limit allocated to the CDQ Program varies by both species and management area. These allocations, in turn, provide an opportunity for residents of these communities to participate in and benefit from the BSAI fisheries.

A total of 65 communities are authorized under Section 305(i)(1) of the Magnuson-Stevens Act to participate in the program through six CDQ entities.[34] These CDQ entities are non-profit corporations that manage and administer the CDQ allocations, economic development projects, and investments, including ownership interest in the at-sea processing sector and in catcher vessels. Annual CDQ allocations provide a revenue stream for CDQ entities through various channels, including the direct catch and sale of some species, leasing quota to various harvesting partners, and income from a variety of investments.

Geographically dispersed, the members communities extend westward to Atka, on the Aleutian Island chain, and northward along the Bering coast to the village of Wales, near the Arctic Circle. The 2000 population of these communities was just over 27,000 persons of whom approximately 87% were Alaska Native. In general economic terms, CDQ communities are remote, isolated settlements with few commercially valuable natural assets with which to develop and sustain a viable, diversified economic base. As a result, economic opportunities are few, unemployment rates are chronically high, and communities and the region are economically depressed. The CDQ Program ameliorates some of these circumstances by providing an opportunity for residents of CDQ communities to directly benefit from the BSAI fishery resources.

The CDQ Program was implemented by the Council and NMFS in 1992 with allocations of 7.5% of the pollock TAC. Allocations of halibut and sablefish were added to the program in 1995. Authorization for the CDQ Program was added to the Magnuson-Stevens Act by the U.S. Congress in 1996. In 1998, the

[33] Section 11.3 provides an in-depth description of the pollock trawl fishery in which the CDQ entities participate.

[34] The CDQ entities include the Aleutian Pribilof Island Community Development Association (APICDA), the Bristol Bay Economic Development Corporation (BBEDC), the Central Bering Sea Fishermen's Association (CBSFA), the Coastal Villages Region Fund (CVRF), the Norton Sound Economic Development Corporation (NSEDC), and the Yukon Delta Fisheries Development Association (YDFDA).

Council expanded the CDQ Program by adding allocations of the remaining groundfish species, prohibited species, and crab. Currently, the CDQ Program is allocated portions of the groundfish fishery that range from 10.7% for Amendment 80 species, 10% for pollock, and 7.5% for most other species.

In 2007, the six CDQ entities held approximately $543 million in assets. Since inception of the CDQ Program in 1992, the CDQ entities have generated more than $204 million in wages, education, and training benefits. CDQ entities fund fisheries infrastructure investments such as docks, harbors, seafood processing plants, fisheries support centers, and vessels such as motherships and catcher/processors that operate in crab, halibut, and groundfish fisheries. In 2007 fisheries and fishery related investments by the six CDQ entities totaled more than $140 million, primarily in the BSAI. Local programs purchase limited access privileges in the fishery and acquire equity position in existing fishery businesses. The six CDQ entities had total revenues in 2007 of approximately $170 million, of which 41%($70 million) was derived from CDQ royalties. Income from sources other than royalties has exceeded royalty income since 2004, with direct income accounting for 54-59% of revenue annually. (WACDA 2007).

Pollock royalties are a very important source of CDQ Program revenues that directly fund investments in the region. Table 1 shows the estimated total royalties from all CDQ allocations, from pollock CDQ allocations, and an estimate of the average royalty rate ($/mt) for pollock. Pollock royalties have historically represented about 80% of total annual royalties from the CDQ allocations and, in 2005, were approximately $50 million. Specific information about total annual pollock royalties for all CDQ entities combined has not been publically available since 2005.

Table 1. CDQ pollock royalties for 2001-2008. No pollock royalty data is available for 2006 or 2008. *This table contains calculated or estimated values where data were incomplete. The text on page xxx explains how the estimates were calculated.

Year	Total royalties all species (millions $)	Total pollock royalties	% pollock of total royalties	Harvested pollock (mt)	Average royalty ($/mt)
2001	$ 42.6	$ 36.7	86%	139,946	$ 262
2002	$ 46.3	$ 36.6	79%	148,427	$ 247
2003	$ 53.5	$ 42.8	80%	149,121	$ 287
2004	$ 55.4	$ 45.9	83%	149,169	$ 307
2005	$ 61.4	$ 48.5	79%	149,720	$ 324
2006	N/A	N/A	N/A	150,376	N/A
2007	$ 69.7*	$ 43.2*	62%*	139,400	$ 310*
2008	N/A	N/A	N/A	99,959	N/A

The average annual royalty value to the CDQs was calculated from the audited financial statements and data available through public reports and financial statements. CDQ royalty data was collected by species until 2006 therefore no further calculation necessary for 2001-2005. Although NMFS records the weight of pollock harvested by sector annually, insufficient aggregate royalty data are publicly available to estimate forgone pollock royalties for 2006 and 2008. The 2007 estimates are base on an average of APICDA and CVRF total royalties derived from pollock. We applied the average royalty value to the estimates of pollock catch by pollock weight to get our estimates of pollock royalties for the CDQ sector annually. The percentage of pollock royalties was calculated from the total royalty statistics provided in the WACDA 2007 report, 41% of total revenue ($170 million).

Accurate royalty data was collected by NMFS in the CDQ entities audited financial statements. Annually until 2005, NMFS received information about royalties paid, by species or species group, for the CDQ allocations. NMFS not been authorized to require submission of accurate royalty information since the 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act. Therefore, we

now rely on royalty information from the CDQ entities publically available annual reports prepared primarily for residents of the member communities. Some of the CDQ entities choose to include specific information about royalties, while others choose not to provide this level of detail in their annual reports. Additional information that would improve the analysis of the impacts of the alternative would be to estimate the foregone values of pollock royalties to the CDQ entities under each alternative. This analysis will be added to the Final EIS if that information becomes available.

Table 9-5 below is from the DEIS/RIR/IRFA (page 464) and provides information about the investments that the CDQ entities have made in vessels that participate in the Bering Sea pollock fisheries. These are significant investments that have been largely funded by pollock royalty revenues.

Table 9-5 from DEIS/RIR/IRFA (CDQ groups and their regional importance):

Region	CDQ group	Percent of population in CDQ group	Volumes of pollock allocated to CDQ group(s) in 2008	Vessel ownership
Kotzebue	None	0	0	none
Norton Sound	Norton Sound Economic Development Corporation	Fifteen FDQ communities with 8,488 persons account for about 98% of the population in this area (Nome census area, excluding Shishmaref).	22,456 mt	Half interests in three large CPs through their half-ownership of Glacier Fish Company.
Yukon River and delta	Yukon Delta Fisheries Development Association	Six communities with about 3,123 persons account for about 23% of the population in the area (the Wade Hampton and Yukon-Koyukuk census areas minus Takotna, McGrath and Nikolai).	14,266 mt	Significant ownership interests in two large CVs and a pollock mothership
Kuskokwim River and delta	Coastal Villages Region Fund	Twenty communities with about 7,855 persons account for 47% of the regional population (Bethel census area plus Takotna, McGrath, and Nikolai)	24,456 metric tons	46% ownership of American Seafoods and thus has significant interests in eight pollock CPs, and one CV
Bristol Bay, Alaska Peninsula, Aleutians, Pribilofs	Central Bering Sea Fishermen's Association; Aleutian-Pribilof Island Community Development Association; Bristol Bay Economic Development Corporation	Twenty-three communities with 7,605 persons account for about 57% of the regional population (Aleutians East and West, Lake and Peninsula, and Dillingham census districts, minus certain communities around Lake Iliamna.	40,760 metric tons	CBSFA has significant ownership interests in three large CVs; APICDA has significant interests in a large CV and a large CP; BBEDC has significant interests in six CVs and a CP
Elsewhere	None	0	0	None
Notes: Pollock allocations are from 2008 groundfish specifications. Gross revenues associated with vessel interests are confidential and have not been reported. Population information is from the 2000 census. Vessel ownership information is estimated from a variety of sources for 2008.				

CDQ entities have invested in inshore processing plants, for halibut, salmon, Pacific cod, and other species. For example, CVFR owns Coastal Villages Seafoods 7 salmon and halibut processing plants, BBEDC holds 50% ownership in Ocean Beauty Seafoods, APICDA owns processing plants in False Pass and Atka, and YDFDA has invested in a salmon processing barge in Emmonak. CDQ entities have invested in other local fisheries development activities as well. For example,

> A number of CDQ entities have also promoted investment in local, small-scale operations targeting salmon, herring, halibut or other species. Activities include funding permit brokerage services to assist with retention of limited entry salmon permits in CDQ communities, capitalizing revolving loan programs to provide financing to resident fishermen for the purchase of boats and gear and supporting market development for locally-harvested seafood products (Northern Economics 2002).

CDQ entities have also worked to develop regional fisheries infrastructure. The NSEDC has provided funding for a Nome seafood center; the YDFDA has provided funding for the Emmonak Tribal Council's fish plant, the CBSFA purchased a custom halibut vessel, and the CVRF owns 14 fisheries support centers. In some cases these projects are completely funded with earnings from investments in the BSAI pollock fishery (Northern Economics 2002 & 2009; WACDA 2007, Pollock Provides 2008).
CDQ entities invest in projects that directly or indirectly support commercial fishing for halibut, salmon, and other nearshore species. This includes substantial investments in seafood branding and marketing, quality control training, safety and survival training, construction and staffing of maintenance and repair facilities that are used by both fishermen and other community residents, and assistance with bulk fuel procurement and distribution. Several CDQ entities are actively involved in salmon assessment or enhancement projects, either independently or in collaboration with ADF&G. Salmon fishing is a key component of western Alaska fishing activities, both for subsistence and at the commercial level. The CDQ Program provides a means to support and enhance both commercial and artisanal fishing opportunities.

Increasingly CDQ entities contribute to the region by providing educational and training opportunities, contributing to community capital investments, and expanding the state and local tax base. Investments are made to support targeted vocational training and providing post secondary educational scholarship opportunities to residents. CDQ and Non-CDQ villages benefit from a trained workforce well-suited for sustaining a fisheries-based economy. In 2007 CDQ entities invested approximately $2.5 million dollars to create over 1,200 scholarships and training opportunities. Community capital has been expanded in Western Alaska through investment in infrastructure projects such as docks and clinics. In 2007, the increased economic activity generated by the CDQ Program contributed $800,000 in state and regional taxes and fees in addition to the aggregated community capital investments of $40 million (WACDA 2007).

One of the most tangible direct benefits of the CDQ Program has been employment opportunities for western Alaska village residents. CDQ entities provide career track employment opportunities for residents of qualifying communities, and have opened opportunities for non-CDQ Alaskan residents, as well. Jobs generated by the CDQ Program included work aboard a wide range of fishing vessels, internships with the business partners or government agencies, employment at processing plants, and administrative positions. Many of the jobs are associated with shoreside fisheries development projects in CDQ communities. This includes a wide range of projects, including those directly related to commercial fishing. Examples of such projects include building or improving seafood processing facilities, purchasing ice machines, purchasing and building fishing vessel, gear improvements, and construction of docks or other fish handling infrastructure. In 2007 more than 3,000 crew members, commercial fisheries permit holders and wage and salaried employees received payments and wages totaling more than $30 million (WACDA 2007).

CDQ wages vary as a percent of total adjusted gross income within the region. A Northern Economics study from 2002 found that, in 1999, CDQ wages were about 2% of total adjusted gross income within the NSEDA communities, about 10% within the YDFDA communities, about 5% within the CVRF communities, about 2% within the BBEDC communities, about 10% with in the APICDA communities,

and about 9% within the CBSFA. It is expected that continued investments, in various fisheries assets, will increase capacity for earned within these communities and this trend will continue to increase in future years (SWAMC 2007, Northern Economics 2002 & 2009, ADCCED).
CDQ revenues benefit member communities and provide benefits to non-member communities. Non-member fishermen contribute catch to CDQ processing plants and residents of non-member communities gain employment in CDQ related projected. For example, more than 10% of the CVRF employees are residents of non-CDQ communities. There are many non-member communities that may be affected by this action including regional hubs like Bethel that provide salmon buying stations for both member and non-member communities. Communities on the mid to upper Yukon, and tributary rivers of the Yukon and communities above the lower fifty miles or so of the Kuskokwim are not members of CDQ entities. Most communities in Kotzebue Sound would not be included; however, communities in this area are more dependent on chum salmon and may not be greatly affected by an action to minimize Chinook salmon bycatch in the BSAI pollock fishery.

Additions to the Impact Analysis

The DEIS provided estimates of the impacts of the alternatives on the CDQ sector using the same methods and level of information provided for the non-CDQ sectors (Section 10.5.2 starting on page 652). These impacts were based on estimates of the foregone gross revenues for the CDQ sector under the alternatives.

Additional information that would improve the impact analysis would be to estimate the foregone values of pollock royalties to the CDQ entities under each alternative. This analysis is summarized below and will be added to the Final EIS.

Tables were created to examine the expected potential impacts on the CDQ Program in lost royalty revenue attributable to the upper-bound estimates of potential reductions in pollock harvested as a result of a fishery closure under the proposed alternative and options. They provide estimates of the foregone pollock CDQ royalties under each of the alternatives and options. Hypothetical foregone CDQ pollock catch, in mt, by season, from 2003-2007, under Chinook salmon hard cap options are in Tables 4-4 through 4-8 of the DEIS. Similar data on the hypothetical foregone pollock catch under the PPA 1&2 is in Table 4-20 of the DEIS. Average value per metric ton of pollock was estimated and averaged annually and is summarized in Table 1.

Insufficient aggregate royalty data is publicly available to estimate forgone pollock royalties for 2006. Although the estimate of pollock royalty revenue is not based on an average of all CDQ groups, the hypothetical forgone royalty revenues for all CDQ Programs would be higher under PPA 1 than under a 68,100 cap and the 70/30 seasonal split in bycatch allocations (alternative 2:option 2d) see table 10-118a. Using similar royalty estimates for 2007, the hypothetical forgone royalty revenues for all CDQ Programs would be higher under a 48,700 cap and the 70/30 seasonal split in bycatch allocations (alternative 2: option 2d) see table 10-119a than under PPA 2. Royalty revenue would only have been forgone in 2007 A-season in most allocation scenarios except when the hypothetical cap was under 87,500 Chinook salmon. Forgone royalty revenue would hypothetically have occurred in the A-season for all years with a hard cap of 29,300 Chinook salmon. Hypothetical forgone pollock royalties were consistently lower in the a season under a allocation split 50/50 and consistently lower under a 70/30 split; conversely, the hypothetical forgone pollock royalties were consistently higher in the B season under a 70/30 allocation split and consistently lower under a 50/50 split, in all years that data was available except for 2005 (Table 10-XA- 10-XE).

A comparison of allowable rollover scenarios for PPA 1 and PPA 2 resulted in substantial forgone royalty revenues for CDQ groups under a hypothetical 0% A to B season rollover from in both 2004 and 2007.

Analysis of the forgone royalty revenue by CDQ groups showed no difference in B Season foregone CDQ royalties due to A season transfers and rollovers options. Also, there are no hypothetical reductions in foregone CDQ royalties due to transferability by PPA scenario in millions of dollars over the time period 2003-2007 (Table 10-XF).

Table 10-118*a* . 2007 hypothetical forgone pollock royalties to the CDQ Program for Alternative 2, option 2d (70/30 season split, cap 68,100), compared with PPA1 (cap 68,392), data taken from table 4-20.

		Foregone pollock (in mt)	**Forgone royalty (millions of $)**	**% of total pollock royalties**	**% of total royalties**
2007 CDQ					
Alternative 2: option 2d					
	A season	0	$ -	0%	0%
	B season	2,983	$0.9	2%	1%
Total Alternative 2		2,983	$0.9	2%	1%
Alternative 4:PPA1					
	A season	0	$ -	0%	0%
	B season	4,415	$1.4	3%	2%
Total Alternative 4		4,415	$1.4	3%	2%

Table 10-119*a*. 2007 hypothetical forgone pollock royalties to the CDQ Program for Alternative 2, option 2d (70/30 season split, cap 48,700) compared with PPA2 (cap 47,591), data taken from table 4-20.

		Foregone pollock (in mt)	**Forgone royalty (millions of $)**	**% of total pollock royalties**	**% of total royalties**
2007 CDQ					
Alternative 2: option 2d					
	A season	19,389	$6.0	14%	9%
	B season	5,335	$1.7	4%	2%
Total Alternative 2		24,724	$7.7	18%	11%
Alternative 4:PPA2					
	A season	10,281	$3.2	7%	5%
	B season	6,057	$1.9	4%	3%
Total Alternative 4		16,338	$5.1	12%	7%

Estimated foregone pollock (mt) to the CDQ sector from Alternative 2, option 2d is from Table 4-8 of the DEIS and for the PPA is from Table 4-20 of the DEIS. The estimated pollock royalty rate in 2007 was $310/mt.

Table 10-XA. Hypothetical forgone CDQ royalties by year and season under Chinook bycatch options for fleet-wide caps in millions of dollars.

Season		**2003**			**2004**			**2005**			**2006**			**2007**		
	Cap	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A	87,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	N/A	N/A	N/A	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	N/A	N/A	N/A	$2.6	$0.3	$ -
	48,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	N/A	N/A	N/A	$9.6	$6.1	$2.6
	29,300	$6.4	$5.9	$0.3	$0.1	$ -	$ -	$1.1	$0.01	$ -	N/A	N/A	N/A	$12.7	$12.5	$9.8
B	87,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	N/A	N/A	N/A	$ -	$ -	$0.7
	68,100	$ -	$ -	$ -	$ -	$ -	$1.1	$ -	$ -	$ -	N/A	N/A	N/A	$ -	$0.7	$0.9
	48,700	$ -	$ -	$ -	$ -	$1.1	$4.7	$ -	$ -	$ -	N/A	N/A	N/A	$0.8	$0.9	$1.6
	29,300	$ -	$ -	$6.9	$4.7	$8.7	$13.9	$ -	$ -	$ -	N/A	N/A	N/A	$1.6	$1.7	$2.3

Table 10-XB. Hypothetical forgone CDQ royalties by season under Chinook bycatch options for 2003 in millions of dollars.

2003		opt1(AFA)			opt2a			opt2d		
Seas	Cap	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A	87,500	$ -	$ -	$ -	$ 5.8	$ 2.2	$ -	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$10.7	$ 6.2	$ 2.4	$ -	$ -	$ -
	48,700	$ -	$ -	$ -	$13.8	$13.7	$10.7	$ 0.2	$ -	$ -
	29,300	$ 2.3	$ -	$ -	$14.9	$14.0	$13.9	$12.7	$ 6.4	$ 5.7
B	87,500	$ -	$ -	$ -	$ -	$ -	$ 0.6	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$ -	$ 0.0	$ 7.1	$ -	$ -	$ -
	48,700	$ -	$ -	$ -	$ 3.1	$ 7.1	$14.9	$ -	$ -	$ -
	29,300	$ -	$ -	$ -	$14.9	$15.1	$15.5	$ -	$ 0.6	$ 7.2

Table 10-XC. Hypothetical forgone CDQ royalties by season under Chinook bycatch options for 2004 in millions of dollars.

2004		opt1(AFA)			opt2a			opt2d		
Seas	Cap	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A	87,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$ 1.2	$ -	$ -	$ -	$ -	$ -
	48,700	$ -	$ -	$ -	$ 4.1	$ 1.6	$ 1.2	$ -	$ -	$ -
	29,300	$ -	$ -	$ -	$ 7.6	$ 7.4	$ 4.4	$ 1.3	$ 0.1	$ -
B	87,500	$ -	$ -	$ -	$ 1.4	$ 4.7	$ 9.0	$ -	$ -	$ 0.8
	68,100	$ -	$ -	$ -	$ 8.5	$ 8.9	$14.0	$ -	$ -	$ 1.4
	48,700	$ -	$ -	$ 1.2	$ 9.1	$14.0	$14.5	$ 1.0	$ 1.4	$ 8.7
	29,300	$ 1.2	$ 4.4	$ 8.8	$14.5	$18.5	$18.7	$ 8.7	$ 9.0	$14.1

Table 10-XD. Hypothetical forgone CDQ royalties by season under Chinook bycatch options for 2005 in millions of dollars.

2005		opt1(AFA)			opt2a			opt2d		
Seas	Cap	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A	87,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$ 3.8	$ 0.9	$ -	$ -	$ -	$ -
	48,700	$ -	$ -	$ -	$ 7.3	$ 6.9	$ 3.8	$ -	$ -	$ -
	29,300	$ -	$ -	$ -	$11.1	$ 8.0	$ 7.7	$ 6.6	$ 1.1	$ -
B	87,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	68,100	$ -	$ -	$ -	$ -	$ -	$ 0.0	$ -	$ -	$ -
	48,700	$ -	$ -	$ -	$ -	$ 0.0	$ 1.8	$ -	$ -	$ -
	29,300	$ -	$ -	$ -	$ 1.8	$ 3.1	$ 4.5	$ -	$ -	$ 0.1

Table 10-XE. Hypothetical forgone CDQ royalties by season under Chinook bycatch options for 2007 in millions of dollars.

2007		opt1(AFA)			opt2a			opt2d		
Seas	Cap	50/50	58/42	70/30	50/50	58/42	70/30	50/50	58/42	70/30
A	87,500	$ -	$ -	$ -	$10.0	$ 9.8	$ 9.6	$ 2.4	$ -	$ -
	68,100	$ -	$ -	$ -	$12.7	$12.6	$ 9.9	$ 6.0	$ 2.6	$ -
	48,700	$ .8	$ 2.4	$ -	$12.9	$12.9	$12.7	$ 9.8	$ 9.6	$ 6.0
	29,300	$ 9.9	$ 9.7	$ 6.2	$15.1	$13.1	$13.0	$12.8	$12.7	$10.0
B	87,500	$ -	$ -	$ -	$ 0.9	$ 1.6	$ 1.7	$ -	$ 0.4	$ 0.8
	68,100	$ -	$ -	$ 0.7	$ 1.6	$ 1.7	$ 2.3	$ 0.4	$ 0.8	$ 0.9
	48,700	$ 0.4	$ .7	$ 0.9	$ 2.3	$ 2.3	$ 3.1	$ 0.8	$ 0.9	$ 1.7
	29,300	$ 0.9	$ 1.6	$ 1.7	$ 3.1	$ 3.1	$ 4.2	$ 1.7	$ 1.7	$ 2.3

Table 10-XF. Hypothetical forgone CDQ royalties by sector and scenario had dates presented in Table x-1 above been invoked as closures assuming 0%, 80%, and 100% allowable rollover from A to B season, in millions of dollars.

PPA	A-seas Transfer-Ability	Year	A-Seas CDQ	A-B Roll over	B-Seas CDQ	A-seas Transfer-Ability	Year	A-Seas CDQ	A-B Roll over	B-Seas CDQ	A-seas Transfer-Ability	Year	A-Seas CDQ	A-B Roll over	B-Seas CDQ
1		2003	$ -		$ -		2003	$ -		$ -		2003	$ -		$ -
		2004	$ -		$4.9		2004	$ -		$ -		2004	$ -		$ -
		2005	$ -		$ -		2005	$ -		$ -		2005	$ -		$ -
		2006	$ -		$ -		2006	$ -		$ -		2006	$ -		$ -
	No	2007	$ -		$1.45	No	2007	$ -		$1.36	No	2007	$ -		$1.36
		2003	$ -		$ -		2003	$ -		$ -		2003	$ -		$ -
		2004	$ -		$4.9		2004	$ -		$ -		2004	$ -		$ -
		2005	$ -		$ -		2005	$ -		$ -		2005	$ -		$ -
		2006	$ -		$ -		2006	$ -		$ -		2006	$ -		$ -
	Yes	2007	$ -	**0%**	$1.45	Yes	2007	$ -	**80%**	$1.36	Yes	2007	$ -	**100%**	$1.36
2		2003	$ -		$ -		2003	$ -		$ -		2003	$ -		$ -
		2004	$ -		$11.5		2004	$ -		$ -		2004	$ -		$ -
		2005	$ -		$ -		2005	$ -		$ -		2005	$ -		$ -
		2006	$ -		$ -		2006	$ -		$ -		2006	$ -		$ -
	No	2007	$3.2		$ 1.9	No	2007	$3.2		$1..9	No	2007	$ 3.2		$1.9
		2003	$ -		$ -		2003	$ -		$ -		2003	$ -		$ -
		2004	$ -		$11.5		2004	$ -		$ -		2004	$ -		$ -
		2005	$ -		$ -		2005	$ -		$ -		2005	$ -		$ -
		2006	$ -		$ -		2006	$ -		$ -		2006	$ -		$ -
	Yes	2007	$3.2		$1.9	Yes	2007	$ 3.2		$1.9	Yes	2007	$ 3.2		$ 1.9

References

Western Alaska Community Development Association (WACDA). Supporting the Advancement of Bering Sea Communities. 2007.

Blue Ribbon Committee on the Western Alaska CDQ Program Report to the Governor of the State of Alaska. August 2005.

Northern Economics. The Seafood Industry in Alaska's Economy. January 2009.

Coastal Villages Region Fund. "Pollock Provides" video. 2008

CBSFA News, v7 issue 1. October 2006.

2005 Annual Reports of the CDQ entities (CVRF, NSEDC)

2006 Annual Reports of the CDQ entities (APICDA, BBEDC, CVRF, NSEDC, YDFDA)

2007 Annual Reports of the CDQ entities (APICDA, BBEDC, CVRF, YDFDA)

Southwest Alaska Municipal Conference (SWAMC). Southwest Alaska Comprehensive Economic Development Strategy Annual Update 2007. July 2007.

State of Alaska Department of Commerce, Community, and Economic Development (ADCCED). N.D. Community Development Quota (CDQ). http://www.commerce.state.ak.us/bsc/cdq/cdq.htm

Appendix 12 – New Shoreside Impacts Section

Chinook Salmon Bycatch Regulatory Impact Review Addendum providing processing value added effects, as a subset of the overall shoreside sector effects, by port group for Alternative 4.

This addendum to the Regulatory Impact Review (RIR) provides a breakout of the shoreside processing sector revenue (processing value added) by port group. It is important to recognize that this breakout must not be added to the estimated effects on potentially forgone first wholesale gross revenue provided in the RIR for the aggregated shoreside (S) sector. These values are a subset of the values presently provided in the RIR and are intended to highlight the potential effects on value added processing by port group, which are used to protect confidentiality. Two port groups have been created, AKU/DUT, and All Others. The AKU/DUT group denotes the aggregate of all processing facilities in the Akutan and Dutch Harbor areas, including some floating processors. The All Others group includes King Cove, Kodiak, Sand Point, and several floating processors.

Shown below are the breakout of ex-vessel and shoreside processing values, as well as their total, and the percent each group-season-year- category is of the annual grand total value. These percentages are used in this addendum to estimate the potential effects on each port group, in each year and season, by multiplying that percentage by estimated effects on the shoreside sector shown in the RIR. This method "allocates" effects on each group-season-year, relative to their observed proportion of total first wholesale value. Thus, this is not an accounting of actual effects, but rather is a proportionality based estimate of where the potential effects may accrue. This has been done, at least in part, to enhance the presentation of crucial economic impact information, while maintaining confidentiality constraints.

Following the value tables are two tables that provide estimates of shoreside processing revenue (value added) effects, and the percentage of total processing revenue they represent, by port group, year, and season for the Preliminary Preferred Alternative (PPA) (Alternative 4). These estimates are tabulated by multiplying the percentages discussed above, by the shoreside sector effects estimates provided for the PPA in table 10-99 of the RIR.

Bering Sea Pollock Ex-Vessel Value by Port Group and Year ($millions)

Port Group	Season	2003	2004	2005	2006	2007
AKU/DUT	A	$68	$73	$85	$85	$78
	B	$82	$75	$88	$92	$78
	Total	**$149**	**$148**	**$173**	**$177**	**$156**
All Others	A	$4	$5	$7	$6	$6
	B	$5	$6	$7	$7	$6
	Total	**$9**	**$11**	**$13**	**$13**	**$12**
	Grand Total	**$158**	**$159**	**$186**	**$190**	**$168**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Bering Sea Pollock Shoreside Processing Value by Port Group and Year ($millions)

Port Group	Season	2003	2004	2005	2006	2007
AKU/DUT	A	$132	$141	$167	$154	$160
	B	$160	$144	$175	$166	$161
	Total	**$292**	**$285**	**$342**	**$319**	**$322**
KCO/KOD/SPT/FLD	A	$3	$2	$4	$4	$5
	B	$3	$2	$4	$4	$5
	Total	**$6**	**$3**	**$8**	**$8**	**$9**
	Grand Total	**$297**	**$288**	**$350**	**$327**	**$331**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Bering Sea Pollock Total Shoreside Sector Value (Ex-Vessel Value plus Shoreside Processing Value Added) by Port Group and Year ($millions)

Port Group	Season	2003	2004	2005	2006	2007
AKU/DUT	A	$200	$214	$252	$239	$238
	B	$241	$218	$263	$257	$239
	Total	**$441**	**$432**	**$515**	**$496**	**$478**
KCO/KOD/SPT/FLD	A	$7	$7	$10	$10	$10
	B	$8	$7	$11	$11	$10
	Total	**$15**	**$14**	**$21**	**$20**	**$21**
	Grand Total	**$456**	**$446**	**$536**	**$517**	**$498**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Bering Sea Pollock Processing Value as a Percent of Total First Wholesale Value

Port Group	Season	2003	2004	2005	2006	2007
AKU/DUT	A	43.83%	47.93%	47.03%	46.22%	47.83%
	B	52.97%	48.90%	49.03%	49.82%	48.01%
	Total	**96.80%**	**96.83%**	**96.07%**	**96.05%**	**95.84%**
KCO/KOD/SPT/FLD	A	1.45%	1.57%	1.92%	1.90%	2.07%
	B	1.75%	1.60%	2.01%	2.05%	2.08%
	Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
	Grand Total	43.83%	47.93%	47.03%	46.22%	47.83%

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Table 10-XX: Hypothetical forgone value added processing revenue by year, season, and aggregated port group under PPA1 and PPA2. ($ Millions)

PPA	A-season Transfer-Ability	Year	A-Season AKU/DUT	A-Season All Other	A-Season Processing Total	A-Season S Total	A-B Roll over	B-Season AKU/DUT	B-Season All Other	B-Season Processing Total	B-Season S Total	**Processing Annual Total**	**Ex-Vessel Annual Total**	**Shore side Annual Total**
1	No	2003	$0	$0	$0	$0	0%	$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$5	$0	$5	$10	**$5**	**$5**	**$10**
		2005	$0	$0	$0	$0		$10	$0	$10	$20	**$10**	**$10**	**$20**
		2006	$56	$2	$59	$122		$5	$0	$6	$11	**$64**	**$69**	**$133**
		2007	$59	$3	$61	$123		$17	$1	$18	$36	**$80**	**$80**	**$159**
	Yes	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$5	$0	$5	$10	**$5**	**$5**	**$10**
		2005	$0	$0	$0	$0		$10	$0	$10	$20	**$10**	**$10**	**$20**
		2006	$54	$2	$56	$116		$5	$0	$6	$11	**$61**	**$65**	**$127**
		2007	$59	$3	$61	$123		$17	$1	$18	$36	**$80**	**$80**	**$159**
2	No	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$9	$0	$9	$18	**$9**	**$9**	**$18**
		2005	$0	$0	$0	$0		$13	$1	$14	$27	**$14**	**$13**	**$27**
		2006	$78	$3	$82	$169		$14	$1	$14	$27	**$96**	**$101**	**$197**
		2007	$82	$4	$86	$172		$22	$1	$23	$46	**$109**	**$109**	**$218**
	Yes	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$9	$0	$9	$18	**$9**	**$9**	**$18**
		2005	$0	$0	$0	$0		$13	$1	$14	$27	**$14**	**$13**	**$27**
		2006	$75	$3	$78	$162		$14	$1	$14	$27	**$92**	**$97**	**$189**
		2007	$82	$4	$86	$172		$22	$1	$23	$46	**$109**	**$109**	**$218**
1	No	2003	$0	$0	$0	$0	80%	$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2005	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2006	$56	$2	$59	$122		$4	$0	$5	$9	**$63**	**$68**	**$131**
		2007	$59	$3	$61	$123		$17	$1	$18	$36	**$80**	**$80**	**$159**
	Yes	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2005	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2006	$54	$2	$56	$116		$4	$0	$5	$9	**$60**	**$64**	**$125**
		2007	$59	$3	$61	$123		$17	$1	$18	$36	**$80**	**$80**	**$159**
2	No	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$5	$0	$5	$10	**$5**	**$5**	**$10**
		2005	$0	$0	$0	$0		$10	$0	$11	$21	**$11**	**$10**	**$21**
		2006	$78	$3	$82	$169		$14	$1	$14	$27	**$96**	**$101**	**$197**
		2007	$82	$4	$86	$172		$22	$1	$23	$46	**$109**	**$109**	**$218**
	Yes	2003	$0	$0	$0	$0		$0	$0	$0	$0	**$0**	**$0**	**$0**
		2004	$0	$0	$0	$0		$5	$0	$5	$10	**$5**	**$5**	**$10**
		2005	$0	$0	$0	$0		$10	$0	$11	$21	**$11**	**$10**	**$21**
		2006	$75	$3	$78	$162		$14	$1	$14	$27	**$92**	**$97**	**$189**
		2007	$82	$4	$86	$172		$22	$1	$23	$46	**$109**	**$109**	**$218**

Notes: AKU/DUT: Denotes the aggregate of all processing facilities in the Akutan and Dutch Harbor areas, including some floating processors.
All Others: May include King Cove, Kodiak, Sand Point, and several floating processors.

Table 10-XX: Hypothetical forgone pollock value-added first wholesale revenue, in percent of total forgone pollock revenue, by port group, season, year, for PPA1 and PPA2.(% of total wholesale revenue).

PPA	A-season Transfer-Ability	Year	A-Season				A-B Roll over	B-Season				Processing Annual Total	Ex-Vessel Annual Total	Shore side Annual Total
			AKU/DUT	All Other	Processing Total	S Total		AKU/DUT	All Other	Processing Total	S Total			
1	No	2003	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		3%	10%	4%	4%	2%	3%	2%
		2005	0%	0%	0%	0%		6%	10%	6%	7%	3%	5%	4%
		2006	37%	62%	37%	49%		3%	5%	3%	4%	20%	36%	26%
		2007	37%	56%	37%	49%		11%	17%	11%	15%	24%	48%	32%
	Yes	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		3%	10%	4%	4%	2%	3%	2%
		2005	0%	0%	0%	0%		6%	10%	6%	7%	3%	5%	4%
		2006	35%	59%	35%	47%		3%	5%	3%	4%	19%	34%	25%
		2007	37%	56%	37%	49%		11%	17%	11%	15%	24%	48%	32%
2	No	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		6%	18%	6%	8%	3%	6%	4%
		2005	0%	0%	0%	0%		8%	14%	8%	10%	4%	7%	5%
		2006	51%	86%	52%	68%		8%	14%	8%	10%	29%	53%	38%
		2007	51%	79%	52%	69%		14%	21%	14%	18%	33%	65%	44%
	Yes	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		6%	18%	6%	8%	3%	6%	4%
		2005	0%	0%	0%	0%		8%	14%	8%	10%	4%	7%	5%
		2006	49%	82%	49%	65%		8%	14%	8%	10%	28%	51%	37%
		2007	51%	79%	52%	69%		14%	21%	14%	18%	33%	65%	44%
1	No	2003	0%	0%	0%	0%	80%	0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2005	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2006	37%	62%	37%	49%		3%	4%	3%	3%	19%	36%	25%
		2007	37%	56%	37%	49%		11%	17%	11%	15%	24%	48%	32%
	Yes	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2005	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2006	35%	59%	35%	47%		3%	4%	3%	3%	18%	34%	24%
		2007	37%	56%	37%	49%		11%	17%	11%	15%	24%	48%	32%
2	No	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		3%	10%	4%	4%	2%	3%	2%
		2005	0%	0%	0%	0%		6%	11%	6%	8%	3%	6%	4%
		2006	51%	86%	52%	68%		8%	14%	8%	10%	29%	53%	38%
		2007	51%	79%	52%	69%		14%	21%	14%	18%	33%	65%	44%
	Yes	2003	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%
		2004	0%	0%	0%	0%		3%	10%	4%	4%	2%	3%	2%
		2005	0%	0%	0%	0%		6%	11%	6%	8%	3%	6%	4%
		2006	49%	82%	49%	65%		8%	14%	8%	10%	28%	51%	37%
		2007	51%	79%	52%	69%		14%	21%	14%	18%	33%	65%	44%

Notes: AKU/DUT: Denotes the aggregate of all processing facilities in the Akutan and Dutch Harbor areas, including some floating processors.
All Others: May include King Cove, Kodiak, Sand Point, and several floating processors.