Bering Sea Non-Chinook Salmon PSC Management Measures

INITIAL REVIEW DRAFT
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

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Abstract: The Regulatory Impact Review (RIR) provides decision-makers and the public with an evaluation of the social and economic effects of alternative measures to minimize chum and other salmon, referred to as non-Chinook salmon, Prohibited Species Catch (PSC) in the Bering Sea pollock fishery. This document addresses the requirements of Executive Order 12866, Executive Order 12898, and other applicable federal law. The Environmental Assessment that accompanies this document provides decision-makers and the public with an evaluation of the environmental effects of the alternative to address the requirements of the National Environmental Policy Act and other applicable federal law.

This initial regulatory flexibility analysis (IRFA) evaluates the potential adverse economic impacts on directly regulated small entities accruing from the proposed action. If approved, the action would establish either a non-Chinook salmon prohibited species catch limit for each Bering Sea pollock fishing season and sector, which, when reached, would require all directed pollock fishing to stop for that season, or establish triggered closure areas with the option to exempt certain vessels from closures if they participate in a rolling hotspot closure system. This IRFA addresses the requirements of the Regulatory Flexibility Act.

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Table of Contents

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This Regulatory Impact Review (RIR) examines the costs and benefits of a proposed regulatory amendment to change Non-Chinook salmon prohibited species catch (PSC) reduction measures in the Bering Sea pollock trawl fishery. This RIR examines the costs and benefits of proposed alternatives that would implement new management measures to minimize chum salmon bycatch in the Bering Sea pollock fishery. Current management measures include a PSC limit or "cap" that triggers closure of the Chum Salmon Savings Area (SSA) and exemption to this closure for participants in the rolling hotspot system intercooperative agreement (RHS ICA). The alternatives represent a range of PSC management measures that include new or revised caps, closure areas, and RHS ICA components. The alternative set also contains components that allow for sector level allocations of hard caps, transfers and/or rollover provisions, and cooperative management provisions. The complete alternative set is summarized in Chapter 4 and described in detail in EA Chapter 2.

1.1 What is a Regulatory Impact Review?

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 *FR* 51735: October 4, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

> 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.

E.O. 12866 requires that the Office of Management and Budget (OMB) review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

1.2 Statutory Authority

Under the Magnuson-Stevens Act (16 USC 1801, et seq.), the United States has exclusive fishery management authority over all marine fishery resources found within the EEZ. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the Council has the responsibility for preparing FMPs and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish.

The Bering Sea pollock fishery in the EEZ off Alaska is managed under the FMP for Groundfish of the Bering Sea and Aleutian Islands. The salmon PSC management measures under consideration would amend this FMP and federal regulations at 50 CFR 679. Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of federal law and regulations.

1.3 Purpose and Need for Action

The purpose of chum salmon PSC management in the Bering Sea pollock fishery is to reduce chum salmon PSC to the extent practicable, while achieving optimum yield. Minimizing chum salmon PSC while achieving optimum yield is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of chum salmon, provide maximum benefit to fishermen and communities that depend on chum salmon and pollock resources, and comply with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and other applicable federal law. National Standard 9 of the Magnuson-Stevens Act requires that conservation and management measures shall, to the extent practicable, minimize bycatch.

National Standard 1 of the Magnuson-Stevens Act requires that conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. Section 3(33) of the Magnuson-Stevens Act 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…" NMFS has established in regulations at 50 CFR 679.20(a)(1)(i) that the optimum yield for the Bering Sea and Aleutian Island Management area is a range from 1.4 to 2.0 million metric tons (t).[1]

The BSAI FMP defines total allowable catch (TAC) as the annual harvest limit for a stock or stock complex, derived from the acceptable biological catch by considering social and economic factors. NMFS's regulations at 50 CFR 679.20(a)(2) provide that the sum of the TACs so specified must be within the optimum yield range. The BSAI FMP provides further elaboration of the differences among optimum yield (OY), acceptable biological catch (ABC) and 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).

Recognizing that salmon PSC management measures precluding the pollock fishery from harvesting its entire TAC for any given year are not determinative of whether the BSAI groundfish fishery achieves OY, providing the opportunity for the fleet to harvest the TAC in any given year is one aspect of achieving optimum yield in the long term.

Several management measures are currently used to minimize chum salmon PSC in the Bering Sea pollock fishery. Chum salmon taken incidentally in groundfish fisheries are classified as prohibited

[1] In addition, through the Consolidated Appropriations Act of 2004 (Pub. L. 108-199), Congress required that the optimum yield for groundfish in the BSAI shall not exceed 2 million metric tons.

species and, as such, must be either discarded or donated through the Prohibited Species Donation Program. In the mid 1990s, NMFS implemented regulations recommended by the Council to control the bycatch, or PSC, of chum salmon taken in the Bering Sea pollock fishery. These regulations established the Chum SSA and mandated year-round accounting of chum salmon PSC in the trawl fisheries.

The Chum SSA is a time-area closure designed to reduce overall non-Chinook salmon PSC in the federal groundfish trawl fisheries. This time-area closure was adopted based on historically observed salmon PSC rates and was designed to avoid areas and times of high non-Chinook salmon PSC. The Chum SSA is closed to pollock fishing from August 1 through August 31 of each year. Additionally, if the PSC limit of 42,000 non-Chinook salmon is caught by vessels using trawl gear in the Catcher Vessel Operational Area during the period August 15 through October 14, the Chum SSA remains closed to directed fishing for pollock for the remainder of the period September 1 through October 14.

The Council started considering revisions to salmon PSC management in 2004, when information from the fishing fleet indicated that it was experiencing increases in Chinook and chum salmon PSC following the regulatory closure of the Chinook Salmon Savings Areas. This indicated that, contrary to the original intent of the savings area closures, Chinook and chum salmon PSC rates appeared to be higher outside of the savings area than inside the area. While, upon closure, the non-Community Development Quota (non-CDQ) fleet could no longer fish inside the Chinook and Chum Salmon Savings Area, vessels fishing on behalf of the CDQ groups were still able to fish inside the area because the CDQ groups had not yet reached their portion of the Chinook salmon PSC limit. Much higher salmon PSC rates were reportedly encountered outside of the closure areas by the non-CDQ fleet than experienced by the CDQ vessels fishing inside. Further, the closure areas increased costs to the pollock fleet and processors.

To address this problem, the Council examined other means that were more flexible and adaptive to minimize salmon PSC. The fleet voluntarily started the RHS program in 2001 for chum salmon and in 2002 for Chinook salmon. The exemption to area closures for the RHS ICA was first implemented through an exempted fishing permit in 2006 and 2007 subsequently, in 2008, through Amendment 84 to the BSAI FMP. Under Amendment 84, the requirements for an RHS ICA were implemented in federal regulations and vessels, and CDQ groups participating in an RHS ICA approved by NMFS were exempted from closures of the Chinook and Chum Salmon Savings Areas. The RHS ICA was intended to increase the ability of pollock fishery participants to minimize salmon PSC by giving them more flexibility to move fishing operations to avoid areas where they experience high rates of salmon PSC. Additional information about Amendment 84 is in Section 2.1.

The Council took additional action to minimize Chinook salmon PSC in the Bering Sea pollock fishery under Amendment 91 to the BSAI FMP. Amendment 91 was approved by the Council in 2009 and implemented by NMFS in January 2011. This management program implements sector and seasonal Chinook salmon PSC limits ("hard caps"), provisions for higher caps for participants in an approved incentive plan agreement, and a Chinook salmon PSC "performance standard." Additional information about Amendment 91 and management and monitoring modifications as a result of this program are contained in Chapter 2 of the accompanying Environmental Assessment (EA). The Council is now considering whether additional management measures are needed to minimize the PSC of chum salmon in the Bering Sea pollock fishery.

1.4 Market Failure Rationale

The OMB guidelines for analysis under E.O. 12866 state that…

> in order to establish the need for the proposed action, the analysis should discuss whether the problem constitutes a significant market failure. If the problem does not constitute a

> market failure, the analysis should provide an alternative demonstration of compelling public need, such as improving governmental processes or addressing distributional concerns. If the proposed action is a result of a statutory or judicial directive (sic) that should be so stated.[2]

Pollock taken in the Bering Sea trawl fishery, and salmon caught incidentally to this fishery are both common property resources. However, both are subject to systems of stock and allocation management. These management systems include forms of ownership of access and harvest allocation privileges. Trawl vessel operations in the Bering Sea groundfish fisheries do not, by virtue of their groundfish access privileges, have ownership or access privileges to salmon. Similarly, salmon harvesters operating in the waters of and off Alaska do not have, by virtue of their salmon access privileges, ownership or access privileges to groundfish.

Prohibited species catch of salmon in the Bering Sea pollock fishery reduces the common property pool of the salmon resource. Removals of salmon PSC may reduce the targeted subsistence, commercial, personal use, and sport catch of salmon, and thereby the welfare (e.g., revenue, utility) of salmon harvesters who have recognized salmon access privileges (e.g., Alaska Limited Entry permits) and established priority harvesting rights and historical dependence (e.g. subsistence). Salmon removals may, over time, reduce the value of salmon access privileges as well as reducing the economic, social, and cultural benefits for subsistence and other non-commercial users of this resource. Under the prevailing fishery management structure, the market has no efficient mechanism by which groundfish harvesters may compensate salmon harvesters for the salmon lost to PSC. Further, the market cannot readily measure many aspects of the value of salmon, such as the cultural significance of salmon to the subsistence user. Thus, salmon PSC reduction measures are imposed through regulation to reduce, to the extent practicable, this market failure. The goal of the action considered in this RIR is to improve non-Chinook salmon avoidance in the Bering Sea pollock fishery and, thereby, further mitigate the market failure.

[2] Memorandum from Jacob Lew, OMB director, March 22, 2000. “Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements” Section 1.

2.0 Description of the Bering Sea Pollock Fishery

Pollock are widely distributed in the North Pacific, from Central California into the eastern Bering Sea, along the Aleutian arc, around Kamchatka, in the Okhotsk Sea, and into the southern Sea of Japan. In U.S. waters of the Bering Sea and Aleutian Islands (BSAI), NMFS manages pollock as three separate stocks: the Eastern Bering Sea (EBS) stock, found on the EBS shelf from Unimak Pass to the U.S.-Russia Convention line; the Aleutian Islands region stock, found on the Aleutian Islands shelf region from 170°W to the U.S.-Russia Convention line; and the Aleutian Basin or Bogoslof stock, which is a mixture of pollock that migrate from the U.S. and Russian shelves to the Aleutian Basin.

The largest of these is the EBS stock. The Aleutian Islands region pollock stock was closed to directed fishing between 1999 and 2003; in 2004, however, the total allowable catch (TAC) was reestablished for Aleutian Islands pollock to provide for economic development in Adak, Alaska. The Aleutian Basin pollock stock has been closed to directed fishing since 1991, due to low biomass levels.

Pollock continues to represent over 40 percent of the global whitefish production with the market disposition split fairly evenly between fillets, whole (head and gutted), and surimi. An important component of the commercial production is the sale of roe from pre-spawning pollock.

Prior to passage of the Magnuson Fishery Conservation and Management Act of 1976 (now the Magnuson Stevens Act), foreign fisheries dominated the pollock fishery off Alaska. Pollock had been harvested at low levels in the Eastern Bering Sea until the 1950s. With perfected onboard freezing technology in the 1960s, the foreign fisheries conducted mainly by Japanese, Russian, and Korean trawlers expanded. Harvests by these foreign fleets increased rapidly during the late 1960s and, in 1972, reached a reported peak catch of 2.2 million mt of pollock, flatfish, rockfish, cod, and other groundfish.

<u>The Magnuson-Stevens Act</u>

The Magnuson Stevens Act established federal authority over the 200-mile EEZ and, thus, effectively provided for the development of domestic fisheries. United States vessels began fishing for pollock in 1980 through, joint-ventures with foreign processing ships. By 1987, U.S. vessels were taking 99 percent of the quota. Since 1988, only U.S. vessels have been operating in this fishery, and pollock harvests now dominate the commercial groundfish fisheries in waters off Alaska.

<u>The American Fisheries Act (AFA)</u>

Until 1998, the Bering Sea directed pollock fishery had been a managed open access fishery, commonly characterized as a “race for fish.” In 1998, however, Congress enacted the AFA to rationalize the fishery by limiting participation and allocating specific percentages of the Bering Sea directed pollock fishery TAC among the competing sectors of the fishery. After first deducting an incidental catch allowance and 10 percent of the TAC for the Community Development Quota (CDQ) program, the AFA allocates 50 percent of the remaining TAC to the inshore catcher vessels sector; 40 percent to the catcher processor sector; and 10 percent to the mothership sector.

The AFA also allowed for the development of pollock industry cooperatives. Ten such cooperatives were developed as a result of the AFA: seven inshore co-ops, two offshore co-ops, and one mothership co-op. The first cooperative was formed in 1999 by a private-sector initiative, Pollock Conservation Cooperative (PCC), and is made up of nine catcher/processor companies that divide the sector’s overall quota allowance among the companies.

In rationalizing the Bering Sea pollock fishery, the AFA also gave the industry the ability to respond more deliberately and efficiently to market demands than the “race for fish” previously allowed. The AFA also gave the fishery the means to compensate for Steller sea lion conservation measures that,

beginning in 1992, created fishery exclusion zones around sea lion rookeries and haulout sites and implemented gradual reductions in seasonal proportions of the TAC taken in Steller sea lion critical habitat.

As of January 1, 2000, all vessels and processors wishing to participate in the non-CDQ Bering Sea pollock fishery are required to have valid AFA permits on board the vessel or at the processing plant. AFA permits are required even for vessels and processors specifically named in the AFA, and are required in addition to any other Federal or State permits. AFA permits also may limit the take of non-pollock groundfish, crab, and prohibited species, as governed by AFA "sideboard" provisions. With the exceptions of applications for inshore vessel cooperatives and for replacement vessels, the AFA permit program had a one-time application deadline of December 1, 2000, for AFA vessel and processor permits. Applications for AFA vessel or processor permits were not accepted after this date, and any vessels or processors for which an application had not been received by this date became permanently ineligible to receive AFA permits.

Annual Pollock Fishing Seasons

The annual Bering Sea pollock fishery is divided into two seasons: the "A" season, which opens in January and typically ends in April, and the "B" season, which typically runs from July through the end of October. The "A" season fishery has historically focused on roe-bearing females, and is concentrated north and west of Unimak Island and along the 100-meter contour between Unimak and the Pribilof Islands. "A" season pollock also provide other primary products such as surimi and fillet blocks, but yields on these products are slightly lower than in the "B" season, when pollock carry a lower roe content and are thus primarily processed for surimi and fillet blocks. The "B" season fishery takes place west of 170°W.

2.1 Description of the Bering Sea Trawl Pollock Fleet

Number of Vessels

In the 2010 Bering Sea pollock trawl fishery, 80 catcher vessels participated in harvesting pollock, a slight decline since 2004 when 86 catcher vessels participated in the fishery (Table 2-1). Catcher processor participation has held constant at 15 from 2009-2011. Catcher vessels delivering to motherships have ranged from as few as 9, in 2005 and 2006, to 17 in both 2007 and 2008; however participation in this sector dropped to 13 catcher vessels delivering to motherships in 2011.

Gear

In 1990, in response to concerns about salmon PSC and the impact of bottom trawls on seafloor habitat, the Council reduced non-pelagic or bottom trawling, by dividing the BSAI TAC between pelagic (88 percent) and non-pelagic trawling (12 percent). Although most vessels were voluntarily using pelagic trawls by the mid-1990s, non-pelagic trawls were still responsible for amounts of PSC that were much larger than desirable, and in 1999, the Council banned the use of non-pelagic trawls entirely in the Bering Sea pollock fishery.

Ports of Delivery

The vast majority of inshore pollock landings takes place in the ports of Dutch Harbor/Akutan, which reported 699.8 million pounds in groundfish landings for 2000, "the highest landings by pound of any port in the United States" (Hiatt et.al. 2007).
Many of the west coast US-flag catcher/processors that mainly target Bering Sea pollock also target Pacific whiting (a.k.a. hake) off Washington or Oregon, as noted by the At-sea Processors Association (APA; http://www.atsea.org/).

2.2 Total Allowable Catch, Sector Allocations, Harvest, and Value

2003-2010 Bering Sea Pollock Allocations

The Bering Sea pollock TAC is apportioned between inshore, offshore, and mothership sectors after allocations are subtracted for the CDQ program and incidental catch allowances. The pollock fishery is further divided into two seasons—the winter "A" roe season and the summer "B" season. The "B" season is largely non-roe. The 2007-2008 allocation of the TAC in the Bering Sea is as follows:

- 10 percent of TAC is reserved for the CDQ program.
- 2.8 percent of TAC is reserved for the incidental catch allowance
- The remaining TAC is divided between catcher vessels delivering inshore (50 percent); catcher processors processing offshore (40 percent); and deliveries to motherships (10 percent).

The following table (Table 2-1) exhibits the allocations and harvests (in metric tons) in the Bering Sea trawl fisheries from 2003 to 2011. The sectors identified here are the Catcher Vessels (CV), Catcher Processor (CP) Mothership (M), and CDQ sectors.

Table 2-1 Bering Sea pollock allocations, catch, and number of participating vessels; 2004–2011[3]

Year/ TAC	Sector (# of vessels)	Allocation (metric tons)	Pollock Catch (metric tons)
2004	CV (86)	649,580	637,971
1,492,000	CP (17)	519,664	519,570
	M (10)	129,916	129,222
	CDQ	149,200	149,173
2005	CV (84)	653,787	648,117
1,478,000	CP (16)	523,029	517,699
	M (9)	130,757	130,669
	CDQ	149,750	149,715
2006	CV (81)	660,318	645,606
1,487,756	CP (16)	528,254	527,134
	M (9)	132,063	131,404
	CDQ	150,400	150,374
2007	CV (82)	610,736	572,507
1,394,000	CP (16)	488,588	488,543
	M (17)	122,147	121,514
	CDQ	139,400	139,336
2008	CV (80)	434,250	427,741
1,000,000	CP (17)	347,400	346,998
	M (17)	86,850	85,364
	CDQ	100,000	99,964
2009	CV (79)	352,080	349,708
815,000	CP (15)	281,664	281,603
	M (17)	70,416	70,308
	CDQ	81,500	81,478
2010	CV (81)	353,466	351,685
813,000	CP (15)	282,773	282,750
	M (14)	70,693	70,576
	CDQ	81,300	81,275
2011	CV (80)	552,748	519,095
1,266,400	CP (15)	442,198	423,680
	M (13)	110,550	109,856
	CDQ	127,100	116,978

[3] The mothership sector is comprised of three permitted vessels. In some years not all motherships participate in the BSAI pollock fishery. What is shown here, for vessel participation, are the number of CVs that delivered to operating motherships each year.

2.3 Pollock Fishery Tax Revenue

The pollock fishery in waters off Alaska generates tax revenue collected by the State of Alaska in the form of a Fisheries business tax (shoreside processors) and a Fisheries Resource Landings Tax (CPs). Most of the tax revenue is collected from operations in the Aleutian and Pribilof Island areas and is derived from the Bering Sea pollock fishery. Unfortunately, confidentiality restrictions do not allow tax data to be shown for specific ports or communities.

Table 2-2 provides pollock fishery tax revenue collection data, provided by the Alaska Department of Revenue. Also shown is the percent of the statewide pollock fishery total that the Aleutian Pribilof area tax collections represent.

Table 2-2 Pollock fishery tax revenues, 2000-2010

Fisheries Business Tax

Year	Aleutians/Pribilof			Statewide Total			Aleutians Percent of Statewide Total		
	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability
2004	1,340,620,622	$ 142,482,037	$ 4,435,921	1,542,612,076	$ 163,876,620	$ 5,335,064	87%	87%	83%
2005	1,378,682,085	$ 170,218,664	$ 5,207,027	1,605,033,891	$ 200,970,450	$ 6,445,862	86%	85%	81%
2006	1,355,936,834	$ 174,203,650	$ 5,293,490	1,637,736,615	$ 210,842,939	$ 6,704,774	83%	83%	79%
2007	1,182,552,028	$ 159,601,604	$ 4,788,432	1,369,977,746	$ 186,819,595	$ 5,928,597	86%	85%	81%
2008	886,261,331	$ 182,634,855	$ 5,479,258	1,040,930,728	$ 214,191,414	$ 6,797,071	85%	85%	81%
2009	877,709,670	$ 166,577,274	$ 4,997,998	1,013,650,420	$ 192,813,430	$ 6,055,925	87%	86%	83%
2010	755,748,809	$ 140,338,510	$ 4,210,288	930,220,366	$ 172,460,807	$ 5,438,400	81%	81%	77%

Fishery Resource Landing Tax

Year	Aleutians/Pribilof			Statewide Total			Aleutians Percent of Statewide Total		
	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability
2004	1,545,543,121	$ 170,004,347	$ 5,100,130	1,791,760,541	$ 197,108,065	$ 5,913,242	86%	86%	86%
2005	1,563,018,143	$ 187,562,181	$ 5,626,865	1,809,462,262	$ 217,135,477	$ 6,514,064	86%	86%	86%
2006	1,534,011,227	$ 199,421,458	$ 5,982,644	1,819,150,690	$ 236,489,589	$ 7,094,688	84%	84%	84%
2007	1,360,483,103	$ 190,467,633	$ 5,714,029	1,690,952,394	$ 236,733,334	$ 7,102,000	80%	80%	80%
2008	782,362,236	$ 164,099,672	$ 4,922,990	1,200,463,559	$ 251,900,948	$ 7,557,028	65%	65%	65%
2009	710,979,270	$ 135,086,060	$ 4,052,582	1,003,537,069	$ 190,672,042	$ 5,720,161	71%	71%	71%
2010	709,037,668	$ 134,717,157	$ 4.041,515	1,001,771,844	$ 190,336,651	$ 5,710,100	71%	71%	71%

Total (Business + Landing Tax)

Year	Aleutians/Pribilof			Statewide Total			Aleutians Percent of Statewide Total		
	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability	Pounds	Value	Tax Liability
2004	2,886,163,743	$ 312,486,384	$ 9,536,052	3,334,372,617	$ 360,984,685	$ 11,248,306	87%	87%	85%
2005	2,941,700,228	$ 357,780,845	$ 10,833,893	3,414,496,153	$ 418,105,927	$ 12,959,926	86%	86%	84%
2006	2,889,948,061	$ 373,625,108	$ 11,276,133	3,456,887,305	$ 447,332,528	$ 13,799,462	84%	84%	82%
2007	2,543,035,131	$ 350,069,237	$ 10,502,461	3,060,930,140	$ 423,552,928	$ 13,030,597	83%	83%	81%
2008	1,668,623,567	$ 346,734,527	$ 10,402,248	2,241,394,287	$ 466,092,362	$ 14,354,099	75%	75%	73%
2009	1,588,688,940	$ 301,663,334	$ 9,050,580	2,017,187,489	$ 383,485,472	$ 11,776,086	79%	79%	77%
2010	1,464,786,477	$ 275,049,048	$ 8,251,803	1,931,992,210	$ 362,797,458	$ 11,148,499	76%	76%	74%

Notes:
1) Region definition for Aleutian/Pribilof comes from Alaska Dept. of Labor, http://almis.labor.state.ak.us/?PAGEID=67&SUBID=300
2) Data for Aleutian/Pribilof region is based upon tax returns submitted to the Alaska Department of Revenue.
3) Data reported in Alaska Department of Revenue tax returns does not identify where fish are caught. Rather it identifies where processing took place (i.e., Fisheries Business Tax) or location where product was transferred in the state (i.e., Fishery Resource Landing Tax).
4) Data for the region does not include resources exported unprocessed from the state.
5) Statewide totals include amounts from all regions as well as resources exported unprocessed from the state.
Source: Alaska Department of Revenue, special data request:

2.4 Market Disposition of Alaska Pollock

Production

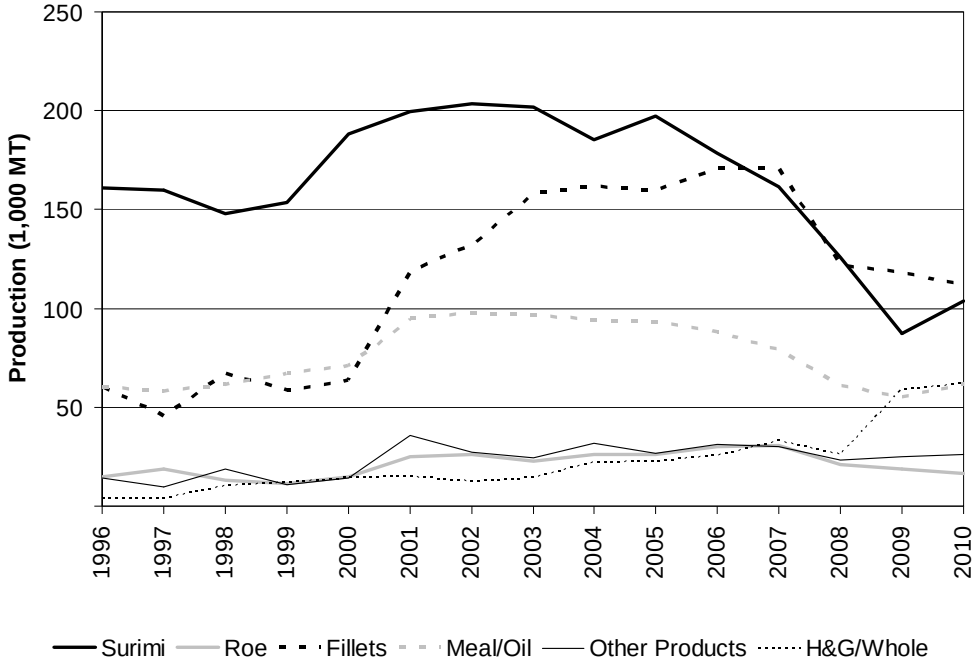
The pollock fishery in waters off Alaska is the largest U.S. fishery by volume, and the economic character of that fishery centers on a varied range of products produced from pollock. In the U.S., Alaska pollock catches are processed mainly for roe, surimi, and several varieties of fillet products. Fillet production has increased particularly rapidly due to more efficient rates of harvests, increased recovery rates, and the shift by processors from surimi to fillet production, all made possible, at least in part, by the AFA. The

information in this section summarizes the more extensive information presented in the 2010 Economic SAFE Report, which incorporated by reference and to which readers are referred to for a more detailed discussion.

Prior to the implementation of the AFA, U.S. pollock catches were processed mainly into surimi. The Bering Sea pollock fishery was then managed as an "open-access" fishery in which vessels sought to harvest as large a share of the TAC as possible before the TAC or established bycatch limits were reached and the fishery closed. Because surimi production allows more raw material to be processed in a shorter period of time than fillet and fillet block production, committing catches for surimi production was to a vessel's operational advantage. With the operational and economic efficiencies gained through rationalization of the fishery under the AFA, the industry was able to abandon practices compelled by the economics of open access and began developing more deliberate production strategies according to market demands.

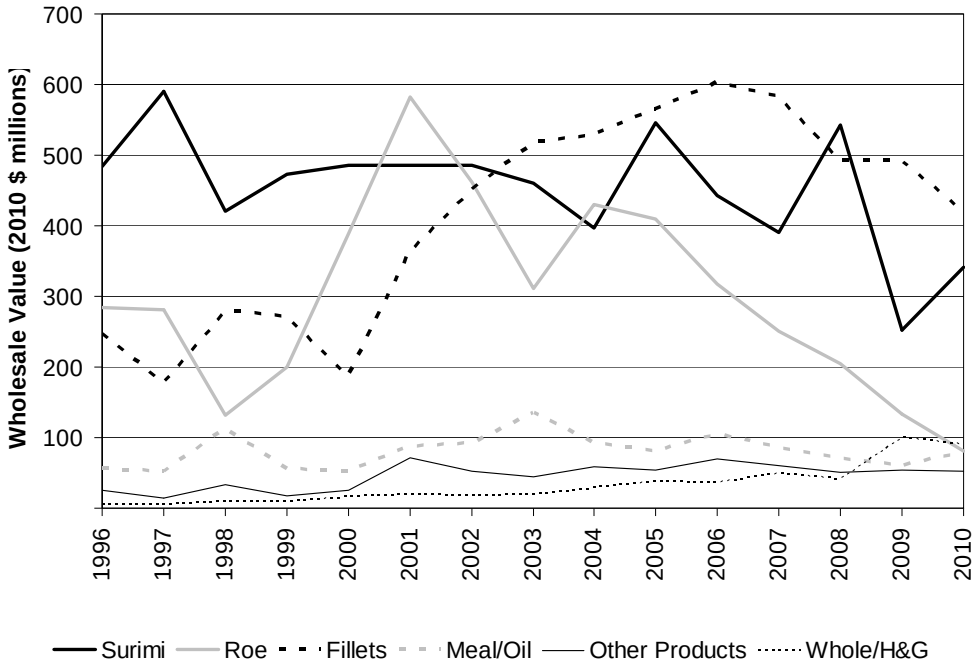
This shift in production practices led, as noted, primarily to a particularly rapid increase in fillet production during the early 2000s, to meet greater world demand for whitefish products created by several factors, including declining harvests in the Russian pollock fishery and a sharp decrease in the supply of fillets from Atlantic cod. The result has been increased fillet production and growth in wholesale gross revenues from U.S. pollock fillet production.

Figure 2-1 shows the Alaskan production of pollock by product from 1996 to 2010. Figure 2-2 shows the estimated wholesale value of these products over the same period. These figures show the dramatic increase in production and wholesale value of fillets from 2000 to 2007. Since 2006; however, the production volume for all pollock products has declined due to reduced TACs, as shown in Table 2-1 above.



Note: Product types may include several more specific products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2009.

Figure 2-1 Alaska primary production of pollock by product type, 1996-2009



Note: Product types may include several more specific products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2009.

Figure 2-2 Wholesale value of Alaska pollock by product type, 1996-2010

International Trade in Pollock Products.

Alaska pollock primary products are utilized in both domestic and foreign markets. Fillet products have been primarily used in domestic finished product production, while the other primary product forms are sold internationally for reprocessing in various finished product forms. The 2010 Economic Safe Document (Hiatt et. Al, 2010) contains market disposition information for these various products; however, the impact analysis contained in this RIR utilizes round weight equivalent first wholesale product prices when converting potential pollock fishery impacts to potential revenue impacts and cannot further identify potential impacts to product form or international trade. Thus, the background information provided here is limited to overall production and value; however, the interested reader may wish to consider the market disposition further by reviewing the 2010 Economic SAFE document (Hiatt, et. Al. 2010).

2.5 Rolling Hotspot System

Amendment 84 to the BSAI FMP provides for the pollock cooperatives to enter into, contractual agreements for reducing salmon PSC by the pollock fleet. These ICAs exempt participating non-CDQ and CDQ pollock vessels from closures of the Chinook and Chum Salmon Savings Areas in the Bering Sea and allow those vessels to use real-time salmon PSC information to avoid high incidental catch rates of non-Chinook and Chinook salmon by establishing hot spot closures. This system is known as the Rolling Hotspot System (RHS).

All parties to the ICA agree to abide by all tenets of the ICA, which provides for retaining the services of a private contractor to gather and analyze data, monitor the fleet, and report necessary PSC information to the parties of the ICA. The ICA requires that the PSC rate of a participating cooperative be compared to a

pre-determined PSC rate (the base rate). All ICA provisions for fleet PSC avoidance behavior, closures, and enforcement are based on the ratio of the cooperative's actual salmon PSC rate to the base rate.

Each cooperative participating in the ICA is assigned to one of three tiers, based on its salmon PSC rate relative to the base rate. Higher tiers correspond to higher salmon PSC rates. Tier assignments determine access privileges to specific areas. A cooperative assigned to a high tier is restricted from fishing in a relatively larger geographic area, to avoid unacceptably high salmon PSC areas. A cooperative assigned to a low tier (based on relatively low salmon PSC rates) is granted access to a wider range of fishing areas. The private contractor tracks salmon PSC rates for each cooperative. A participating cooperative is assigned to a tier each week based on its salmon PSC rate for the previous week. Thus, vessels have economic and operational incentives to avoid fishing behavior that results in high salmon PSC rates.

Parties to the ICA include the following AFA cooperatives: Pollock Conservation Cooperative, the High Seas Catchers Cooperative, the Mothership Fleet Cooperative, the Inshore Cooperatives (Akutan Catcher Vessel Association, Arctic Enterprise Association, Northern Victor Fleet Cooperative, Peter Pan Fleet Cooperative, Unalaska Fleet Cooperative, UniSea Fleet Cooperative, and Westward Fleet Cooperative) and all six CDQ groups. Additionally, two western Alaskan groups that have an interest in the sustainability of salmon resources would be parties in the ICA. All these groups have participated in meetings to develop the ICA and have a compliance responsibility in the agreement.

2.6 Donation of Bycaught Salmon: Prohibited Species Donation Program

The Prohibited Species Donation (PSD) program was initiated to reduce the amount of edible protein discarded under PSC regulatory requirements for salmon and halibut. Some groundfish fishing vessels cannot sort their catch at sea, but deliver their entire catch to an onshore processor or a processor vessel. In these cases, sorting and discarding of prohibited species occurs at delivery, after the fish have died. One reason for requiring the discard of prohibited species is that some of the fish may live if they are returned to the sea with a minimum of injury and delay (e.g., halibut and crab). However, all incidentally caught salmon die in the Alaska groundfish trawl fisheries (NMFS 1996). Therefore, to reduce the waste of edible protein, the PSD program was begun. NMFS implemented the PSD program for salmon in 1996, and expanded the program in 1998 to include Pacific halibut delivered to shoreside processors by CVs using trawl gear. The first donations were received under the PSD program in 1996.

The PSD program allows enrolled seafood processors in the Bering Sea and Gulf of Alaska trawl groundfish fisheries to retain salmon and halibut PSC for distribution to economically disadvantaged individuals through tax-exempt hunger relief organizations. Regulations prohibit authorized distributors and persons conducting activities supervised by authorized distributers from consuming or retaining prohibited species for personal use. They may not sell, trade, or barter any prohibited species that are retained under the PSD program. However, processors may convert offal from salmon or halibut that has been prepared for the PSD program, into fish meal, fish oil, or bone meal, and retain the proceeds from the sale of these products. Fish meal production is not necessarily a profitable venture. The costs for processing and packaging the salmon are donated by the processors participating in the PSD program.

The NMFS Regional Administrator, Alaska Region, may select one or more tax-exempt organizations to be an authorized distributor of the donated prohibited species. The number of authorized distributors selected by the Regional Administrator is based on the following criteria: (1) the number and qualifications of applicants for PSD permits; (2) the number of harvesters and the quantity of fish that applicants can effectively administer; (3) the anticipated level of PSC of salmon and halibut; and (4) the potential number of vessels and processors participating in the groundfish trawl fisheries. After a selection notice is published in the *Federal Register*, a PSD permit is valid for three years, unless suspended or revoked. Regulations at 50 CFR 679.26 describe numerous requirements for authorized

distributors; reporting and recordkeeping requirements for vessels or processors retaining prohibited species under the PSD program; and processing, handling, and distribution requirements for PSD program processors and distributors.

Several inshore pollock processors participate in the PSD program. This program donates salmon, after being seen by an observer, to authorized distributors. Regulations require that donated salmon be headed, gutted, and frozen in a manner fit for human consumption. Generally, per regulatory design, the fishing industry may not gain economic benefit from the catch or disposition of prohibited species. However, the National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement (NOAA OLE) has a policy that allows the heads and guts of these salmon to be processed into fish meal even though these may mean that prohibited species heads and guts could be sold in the form of fish meal. This policy allows processors to accrue a small economic benefit from the offal of prohibited species. Any salmon found at the plant that are not fit for human consumption are returned to the vessel and discarded whole during the vessel's next trip.

Since the program began, in 1996, SeaShare (formerly Northwest Food Strategies) of Bainbridge Island, Washington, has been the sole applicant for a PSD permit for salmon from NMFS, and, therefore, the only recipient of a PSD permit for salmon. The NOAA presented SeaShare with a Marine Stewardship Award in 2006, evidence that the PSD program and its distributor SeaShare are effective. SeaShare is a 501(c)(3) tax-exempt organization that distributes seafood products through America's Second Harvest and its national network of food banks. The most recent selection notice for SeaShare was published in the *Federal Register* on July 15, 2005 (70 FR 40987). SeaShare applied for a permit renewal on March 20, 2008.

Many trawl vessels and all three major shoreside processors operating from Dutch Harbor have participated in the PSD program since its inception as a pilot program in 1994. The shoreside processors Alyeska Seafoods, Inc., and Unisea, Inc., have participated every year; Westward Seafoods, Inc., has participated less frequently. Thirty-six trawl catcher vessels are qualified to participate in the PSD program and deliver to these shoreside processors. Additionally, there are 17 trawl catcher/processors that currently participate in the salmon PSD program; however, catcher/processors may not participate in the halibut PSD program. With existing staff, SeaShare has stated that it could administer up to 40 processors and associated catcher vessels, about twice as many processors as it currently administers (SeaShare 2008).

There is limited information available on the volumes of non-Chinook salmon entering this distribution network. Program statistics do not discriminate between salmon species, although very little salmon of species other than Chinook salmon is believed to enter the system. The total processed or finished weight of Chinook and non-Chinook salmon distributed has ranged from about 38,700 pounds in 1999 up to about 483,400 pounds in 2005. In 2011, 249,825 pounds were distributed (SeaShare, personal communication 2012).[4]

Table 2-3 lists the annual net amount of steaked and finished pounds of PSD salmon received by SeaShare and donated to the food bank system from 1996 through 2008 (SeaShare, personal communication 2011). NMFS does not have the information to accurately convert the net weight of salmon to numbers of salmon. Note that salmon may be consolidated in temporary cold storage in Dutch Harbor awaiting later shipment, so salmon donated in November or December may appear in the results for the following year.

[4] Mary Harmon, SeaShare. Personal communication, November 2, 2012, via e-mail.

Table 2-3 Net weight of steaked and finished PSD salmon received by SeaShare, 1996-2011

Year	Salmon (lbs.)	
1996	89,181	
1997	99,938	
1998	70,390	
1999	38,731	
2000	62,002	
2001	32,741	*
2002	102,551	
2003	248,333	
2004	463,138	
2005	483,359	
2006	171,628	
2007	87,330	
2008	74,237	
2009	59,233	
2010	52.262	
2011	249,825	

*For a time in 2001, processors stopped retaining salmon under the PSD program because regulations prohibited them from processing and selling waste parts of salmon not distributed under the PSD program. The regulations were revised through a final rule published August 27, 2004, to allow processors to use this material for commercial products (69 FR 52609).

The packaged PSD salmon is distributed through SeaShare to food banks located primarily in the Puget Sound area of the Pacific Northwest. Less than full truckload quantities of fish are distributed to Seattle-area food banks that use their freezer trucks to pick up the frozen salmon directly from the freight carriers. Sometimes full truckloads are made available to any qualified food bank within the America's Second Harvest network that is willing to pick it up with a freezer truck and pay for shipping expenses. Due to transportation costs, donated salmon usually stays in the western U.S. Individual food banks distribute the salmon to soup kitchens, shelters, food pantries, and hospices (SeaShare 2008). Over the 12 years that the salmon PSD program has been in place, nearly 2 million pounds of steaked and finished salmon have been donated through the program. Using an estimated four meals per pound of salmon, nearly 650,000 meals have been donated on average, per year. The donated salmon provides a highly nutritious source of protein in the diets of people who have access to only meagre, and often inadequate, food (NMFS 1996).

Expenses for processing the salmon and delivery to the food banks are covered by donations. Fishermen participating in the PSD program must sort, retain, and deliver to an approved storage facility, all salmon destined for the PSD program. Their costs include space on the vessel to store the fish, and maintenance of the fish in suitable condition. Processors must accept delivery, fill out the appropriate paper work and process, refrigerate, package, and store the donated fish, incurring costs in time, labor, and equipment that must be borne by the processor. The PSD salmon must then be delivered from the processor to SeaShare, which then coordinates the temporary storage of the fish, its transportation, and routing to eligible food banks. The transportation costs to Seattle are usually donated by various freight carriers. Participation in the PSD program is entirely voluntary, so an entity that found the program requirements onerous could stop participating without financial cost to itself (NMFS 2003a).

The PSD program reduces waste of salmon PSC catch. Without this program, these fish would be discarded at sea, and would not be directly used by anyone (although discards would be available to

scavengers, potentially benefitting future fish productivity). The PSD program encourages human consumption of these fish, without creating an economic incentive for fishing operations to target them. Under the PSD program, salmon that are unavoidably killed as PSC are directly utilized as high quality human food, improving social welfare and reducing fishery waste.

2.7 The Community Development Quota (CDQ) Program[5]

The Western Alaska Community Development Quota (CDQ) Program is an economic development program associated with federally managed fisheries in the Bering Sea and Aleutian Islands (BSAI). Regulations implementing the CDQ Program designate a portion of the fishery quotas for exclusive use by eligible western Alaska villages. The purpose of the program is to provide western Alaska communities the opportunity to participate and invest in BSAI fisheries, to support economic development in western Alaska, to alleviate poverty and provide economic and social benefits for residents of western Alaska, and to achieve sustainable and diversified local economies in western Alaska. A total of 65 villages are authorized under section 305(i)(1)(D) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to participate in the program. These communities participate in the CDQ Program through six nonprofit corporations (CDQ groups) which manage and administer the CDQ allocations, investments, and economic development projects. The CDQ groups 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). CDQ groups use the revenue derived from the harvest of their fisheries allocations to fund economic development activities and provide employment opportunities.

Geographically dispersed, the member communities extend westward to Atka, on the Aleutian Island chain, and northward along the Bering Sea coast to the village of Wales, near the Arctic Circle (see Table 2-4). The 2000 population of these communities totaled over 27,000 persons of whom approximately 87 percent 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.

[5] The CDQ program information provided here has been updated as of February 2010, with available information from published sources. Concurrently, however, the State of Alaska is conducting a decennial review of the CDQ program as required by law, which will provide information that will, to the extent that it is available, be included in the public (final) review draft RIR for consideration by the Council.

Table 2-4 CDQ groups eligible under the CDQ Program described by their geographic region, number of communities, population, and percentage of the population participating in the CDQ program within each region

Region of Alaska	Name of CDQ Group	Number of CDQ Communities	2000 Census of CDQ Communities	2010 Census of CDQ Communities	Change in Population	Portion of Regional Population Living in CDQ communities 2000	Portion of the the Regional Population living in CDQ communities in 2010	% Change in Population in CDQ Groups
Norton Sound (Nome census area, excluding Shishmaref)	Norton Sound Economic Development Corporation (NSEDC)	15	8,488	8,731	3%	98%	98%	0%
Yukon River and delta (Wade Hampton and Yukon-Koyukuk census, exclude Takotna, McGrath, and Nikolai)	Yukon Delta Fisheries Development Association (YDFDA)	6	3,123	3,210	3%	23%	26%	3%
Kuskokwim River and delta (Bethel census area plus Takotna, McGrath, and Nikolai)	Coastal Villages Region Fund (CVRF)	20	7,855	8,570	9%	47%	49%	2%
Community of Saint Paul Island	Central Bering Sea Fishermen's Association (CBSFA)	1	532	479	-10%	100%	100%	0%
Aleutians East and Aleutian West Boroughs	Aleutian-Pribilof Islands Community Development Association (APICDA)	6	1,143	1,295	13%	14%	15%	1%
Bristol Bay, Lake and Peninsula, and Dillingham Boroughs	Bristol Bay Economic Development Corporation (BBEDC)	17	5,932	5,417	-9%	74%	72%	-2%

2.7.1 CDQ Allocations

The initial intent of the CDQ Program was to provide the means to start regional commercial fishing projects that could develop into sustainable commercial fishing industries in western Alaska. The large-scale commercial fisheries of the BSAI developed in the eastern BS without significant participation from rural western Alaska communities. Under the CDQ Program, a portion of the federal total allowable catch (TAC) for commercially important BSAI species — including pollock, crab, halibut, and various groundfish in the Bering Sea — is allocated to participants in the CDQ Program.

The percentage of each annual BSAI catch limit allocated to the CDQ Program varies by species and management area. The CDQ Program was implemented by the Council and NMFS in 1992 with allocations of 7.5 percent of the pollock TAC. Allocations of halibut and sablefish were added to the program in 1995. In 1996, authorization for the CDQ Program was added to the Magnuson-Stevens Act by the U.S. Congress. In 1998, the 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 percent for Amendment 80 species and 10 percent for pollock to 7.5 percent for most other species. Allocations for these various species are distributed throughout the Bering Sea, Aleutian Islands management areas.

NMFS further allocates pollock, other groundfish, crab, and prohibited species quota among the six CDQ groups based on recommendations made by the State of Alaska in 2005. The 2006 revisions to the Magnuson-Stevens Act fixed the percentage allocations for each fishery at the 2006 levels. A review of each CDQ group's continued eligibility for these allocations will occur in 2012 and every 10-year period thereafter.

2.7.2 Royalties

Annual CDQ allocations provide a revenue stream for CDQ groups through various channels, including the direct catch and sale of some species and the leasing of quota to various harvesting partners. CDQ groups receive royalty payments on each allocation harvested by a partnering firm. Since the CDQ program was implemented, individual groups have used royalty revenue to support the goals of the CDQ program. Royalty revenues support CDQ projects, which encourage sustainable fishery-based economic development in the region or promote the social development of a community or group of communities that are participation in a CDQ Program (e.g. infrastructure development, employment and training programs).

Pollock royalties are a very important source of CDQ Program revenues that directly fund investments and expenditures in western Alaska. Annually until 2005, NMFS received information about royalties paid, by species or species group, for the CDQ allocations; therefore, no further calculation was necessary for 2001 through 2005. Detailed royalty data for each CDQ group is no longer available to NMFS because the CDQ groups are no longer required to submit to the State of Alaska or NMFS the reports through which the royalty data previously was collected. Since 2005, NMFS has relied on information from the CDQ groups' publically available annual reports prepared primarily for residents of the member communities. Some CDQ groups have chosen to present royalty information by species or royalty type. These data are presented in various formats and species groupings; therefore, comparable royalty data are not available across all CDQ groups or in all years.

Table 2-5 shows the estimated total royalties from all CDQ allocations, the portion of royalty revenue attributed by CDQ pollock allocations and the estimated value of pollock CDQ royalties. For 2007 through 2010, the total value of pollock royalties was calculated from the total royalty statistics provided in the annual Western Alaska Community Development Association (WACDA) reports. The average percent royalty was applied to the total royalties to estimate the total value of pollock royalties for the CDQ sector annually. Pollock royalties have historically represented nearly 80 percent of the total annual royalties from the CDQ allocations; however, since 2007 revenue from pollock allocations has decreased as the overall BSAI pollock allocation has decreased.

Table 2-5 CDQ royalties for 2001 through 2008

Year	All species (millions $)	% pollock of all species	Total pollock (millions $)
2001	42.6	86	36.7
2002	46.3	79	36.6
2003	53.5	80	42.8
2004	55.4	83	45.9
2005	60.5	80	48.5
2006	N/A	79*	N/A
2007	69.7	72*	50.3*
2008	66.5	57*	37.9*
2009	59.4	70.9*	42.1*
2010	66.3	70.4*	46.7*

*Calculated or estimated values due to incomplete data.

2.7.3 Revenue from Investments

Although all participants in the CDQ Program are non-profit corporations, earnings are derived from distributions received from investments in companies and vessels. Since the implementation of the CDQ Program, individual groups have made large capital investments in vessels, infrastructure, processing capacity, and specialized gear. Local programs purchase limited access privileges in a fishery and acquire equity position in existing fishery businesses including halibut, sablefish, and crab. Revenue from such investments has exceeded royalty income since 2004, with direct income accounting for a greater portion of the total revenue in most years ranging from 55 to 84 percent annually. In 2010, the six CDQ groups had total revenues of approximately $414.5 million, of which approximately 84 percent, or $348 million, were derived from revenue sources other than royalties (WACDA 2011).

CDQ groups have invested in peripheral projects that directly or indirectly support commercial fishing for halibut, salmon, and other nearshore species. These projects include seafood branding and marketing,

quality control training, safety and survival training, construction and staffing of equipment maintenance and repair facilities, and assistance with bulk fuel procurement and distribution. . In 2010, the six CDQ groups held approximately $737.6 million in assets and they invested more than $251 million in CDQ communities and in fisheries activities (WACDA 2010).

2.7.4 Vessel Ownership

The accumulation of capital assets, such as commercial fishing vessels, is one way CDQ groups attempt to meet the economic and social goals of the CDQ Program. Investments by individual CDQ groups include ownership interest in the at-sea processing sector and in catcher vessels. Such investments are made with the expectation of financial gain or expanding equity in the fishing fleet. Investments in subsidiaries, such as limited liability corporations, allow CDQ groups to wholly or partially own vessels directly related to fisheries. These vessels provide revenue through the direct catch and sale of target species and, in some cases, vessel ownership increases a subsidiary's holdings of quota in fisheries, such as BS pollock. In addition, investments in harvesting and processing capacity provide revenue stream through contractual agreements to harvest other CDQ group's quota, profit sharing, and chartering commercial fishing vessels to government agencies conducting stock assessment surveys. Vessel ownership varies by CDQ group, target species, and affiliation with subsidiary corporations

Table 2-6 CDQ group direct investments in fisheries

Name of CDQ group	Name of Company or Limited Liability Company (LLC)	Percent Company or LLC owned by CDQ	Target species	CDQ Vessel ownership (wholly owned or partially owned)
Norton Sound Economic Development Corporation (NSEDC)[1]	Glacier Fish Company	37.5	BS pollock	Pacific Glacier 276' FT
				Alaska Ocean 376' FT
			Flatfish	Northern Glacier 201' FT
	GB Fisheries LLC	100	Cod	Glacier Bay 154' C/P
	PS Fisheries LLC	100	Crab	Pacific Star 180' CV
	A1 LLC	50	Crab	Aleutian No.1 105' CV
	BSAI Partners LLC	37.5	BS pollock	Alaska Rose 124' CV
		37.5		Bering Rose 124' CV
		39.5		Destination 180' CV
		25.5		Great Pacific 124' CV
		37.5		Sea Wolf 142' CV
		37.5		Messiah 83' CV
		37.5		Ms. Amy 90' CV
Yukon Delta Fisheries Development Association (YDFDA)	American Beauty	75%	BS pollock	American Beauty 123' CV and CDQ pollock quota for Golden Alaska
	Ocean Leader	75%	BS pollock	Ocean Leader 120' CV and CDQ pollock quota for Golden Alaska
	Golden Alaska	26.30%	BS pollock	Golden Alaska 305' MS
Coastal Villages Region Fund (CVRF)	Coastal Villages Pollock LLC	100%	Cod	Deep Pacific 125' FL
				Lilli Ann 141' FL
				North Cape 125' FL
			BS Pollock and yellowfin sole	Northern Hawk 141' C/P
	Coastal Villages Crab LLC	100%	Crab	Arctic Sea 135' CV
				Bering Sea 110' CV
				North Sea 126' CV
				Wassilie B 107' CV
	BSAI Partners LLC	50%	BS Pollock	Alaska Rose 124' CV
				Bering Rose 124' CV
				Destination 180' CV
				Great Pacific 124' CV
				Sea Wolf 142' CV
				Messiah 83' CV
				Ms. Amy 90' CV
			Cod and crab	Bulldog 140' CV
Central Bering Sea Fishermen's Association (CBSFA)	American Seafoods	4.54%	BS pollock and cod	CBSFA has ownership interests in some portion of AFA CPs
	St. Paul Fishing Company, LLC)	75%	BS pollock, crab, cod	Starlite 123' CV
		30%	BS pollock, crab, cod	Fierce Allegiance 166' CV
		30%	crab and cod	Early Dawn 108' CV
		100%	Halibut, Sablefish, Cod	F/V Saint Paul 58' CV
		100%		F/V Saint Peter 58' CV
		75%	crab, BS pollock, cod	Starward 123' CV
Aleutian-Pribilof I. Community Development Association (APICDA)	Golden Dawn LLC	25%	BS pollock, crab, cod	F/V Golden Dawn 148' CV
	Barbra J. LLC	50%	crab and cod	F/V Barbra J. 109' CV
	Alaska Longline Company	25%	cod and sablefish	F/V Prowler 114' FL
				F/V Kjevolja 115' FL
				F/V Bering Prowler 124' FL
				F/V Ocean Prowler 155' (FL) CP

				F/V Arctic Prowler (Under Construction 9/2012) 135' FL
	Farwest Leader LLC	50%	crab and cod	Farwest Leader 105' CV
	Starbound LLC	20%	BS pollock	F/T Starbound 240’
	APICDA Vessels Inc.	100%	Halibut	F/V AP #1 45' F/V AP#2 45' F/V Taty Z 55'
			Halibut and Sablefish	F/V Atka Pride 58'
			Halibut Salmon	F/V Night Rider 47'
			Sport Charter	M/V Pogo 32'
	TNG Fisheries LLC	33%	Halibut and Sablefish	F/V Excellor 58'
				F/V Konrad 58'
Bristol Bay Economic Development Corporation (BBEDC)	Defender Fisheries	49%		Defender 195’ CV
	Doña Martita Investment	50%		Dona Martita 165’ CV
	Arctic Fjord, Inc.	30%		Arctic Fjord 275’ CP
	Neahkahnie	30%		Neahkahnie 110’ CV
	No LLC	50%		Morning Star 148’ CV Morning Star 57’CV Arctic Wind 157’ CV

*Personal communication with Larry Cotter (9/14/2012), Eric Olsen (9/14/2012), Niel Rodriquez (9/14/2012), Joel Cladouhos (9/13/2012), Jeff Kauffman (9/13/2012)

[1] NSEDC fully owns Siu Alaska Corporation which in turn shares vessel ownership.

2.7.5 Economic Development and Public Welfare

CDQ groups expend revenue on CDQ projects intended to support economic development and improve public welfare within the communities in their region. CDQ groups have invested in inshore processing plants, for halibut, salmon, Pacific cod, and other species. For example, APICDA owns processing plants in False Pass and Atka, BBEDC holds 50 percent ownership in Ocean Beauty Seafoods, CVFR owns Coastal Villages Seafoods’ eight salmon and halibut processing plants, NSEDC’s Norton Sound Seafood Products operates processing plants and purchasing stations throughout the region, and YDFDA owns Kwik’pak Fisheries and has provided funding for the Emmonak Tribal Council’s fish processing plant. Capital investments in processing equipment have allowed plants to produce processed seafood products for sale in global seafood markets

CDQ groups have invested in financial services that support small-scale operations targeting salmon, herring, halibut or other species typically found in the near shore. CDQ revenue supports permit brokerages and revolving loan programs which build and sustain fisheries development within their regions. Such programs are intended to retain limited entry salmon permits within CDQ communities, providing the financing necessary for resident fishermen to purchase new boats and gear, and supporting market development for locally-harvested seafood products (Northern Economics 2002).

CDQ groups have developed regional fisheries infrastructure including purchasing custom vessels, improving harbor facilities, and dock upgrades. NSEDC has provided funding for a Nome seafood center; YDFDA has invested in a salmon processing barge in Emmonak; CBSFA purchased the custom halibut vessel, F/V *Saint Paul*; CVRF owns 14 fisheries support centers; and BBEDC, through block grants, plans to improved harbor infrastructure. In some cases these projects are completely funded with earnings from investments in the BSAI fisheries. Regional investments in fisheries infrastructure, such as ice machines, can enable fishermen to sell a higher quality fish at a higher price to local plants.

CDQ projects are not limited to fishery development. Section 305(i)(1)(E)(iii) of the Magnuson-Stevens Act states that CDQ groups may make up to 20 percent of their annual investments in non-fishery related projects within the region. Individual CDQ groups invest in community capital projects such as village infrastructure projects, medical clinics, and environmental programs and projects. Regional investments by CDQ groups have expanded the state and local tax base. In 2010, the economic activity generated by the CDQ Program contributed over $2.5 million in state and regional taxes and fees in addition to the aggregated community capital investments of $19.9 million (WACDA 2010).

2.7.6 Benefits of the CDQ Program to Member Communities

Earnings from royalties and investments enable the CDQ projects to distribute benefits directly to western Alaska communities. One of the most tangible direct benefits of the CDQ program has been employment opportunities for western Alaska village residents. CDQ groups have created 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 include work aboard a wide range of fishing vessels, internships with the business partners or government agencies, employment at processing plants, and administrative positions. Since inception of the CDQ Program in 1992, the CDQ groups have generated an estimated $240 million in wages, education, and training benefits (WACDA 2008).

Many of the jobs generated by the CDQ program are associated with shoreside fisheries development projects in CDQ communities. These projects consist of a wide range of ventures, including those directly related to commercial fishing. Examples include building or improving seafood processing facilities, purchasing ice machines, purchasing and building fishing vessels, gear improvements, and construction of fish handling infrastructure. The CDQ administrative panel estimated that in 2008 more 3,000 crew members, commercial fisheries permit holders and wage and salaried employees received payments and wages of $34.5 million (WACDA 2008).

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 percent of total adjusted gross income within the NSEDC communities, about 10 percent within the YDFDA communities, about 5 percent within the CVRF communities, about 2 percent within the BBEDC communities, about 10 percent within the APICDA communities, and about 9 percent within the CBSFA. It is expected that investments in various fisheries assets have increased the capacity for earnings within these communities beyond the 2002 levels and that this trend will continue to increase in future years (SWAMC 2007, Northern Economics 2002 & 2009, ADCCED).

Another way CDQ groups benefit the region is through expenditures that support targeted vocational training and provide post-secondary educational scholarship opportunities to residents. Each CDQ group provides training and scholarship opportunities for members of eligible communities. CDQ and non-CDQ villages benefit from a trained workforce well-suited for sustaining local employment in a fisheries-based economy. In 2010, the CDQ administrative panel estimated that CDQ groups invested more than $2 million to create 850 scholarships, in addition to an estimated $800,000 to provide 500 training opportunities (WACDA 2010).

While the CDQ program is intended to support economic and social development activities in eligible communities, many non-CDQ communities in western Alaska benefit from the economic development projects. Fishermen and community members from non-CDQ villages utilize the infrastructure, including maintenance and repair facilities, and training available as a result of CDQ revenues. In addition, non-member fishermen contribute catch to CDQ processing plants and residents of non-member communities gain employment in CDQ related projects. For example, in 2008, CVRF estimated that 16 percent of its fish processing employees were residents of non-CDQ communities (CVRF 2008).

Several CDQ groups support salmon assessment and enhancement projects intended to benefit salmon runs throughout western Alaska. Although CDQ communities derive revenue from pollock and other BSAI fisheries, salmon fishing is a key component of fishing activities for many of the CDQ stakeholders and residents of western Alaska. Many communities depend on sustainable salmon runs for subsistence, commercial, cultural, and spiritual practices. The CDQ Program provides a means to support and sustain fisheries based-economies in western Alaska that are deeply rooted in both traditional artisanal fisheries and major commercial operations in the BSAI.

3.0 Potentially Affected Salmon Fisheries

Chapter 5 of the accompanying EA provides an analysis of the impacts of status quo levels of chum salmon PSC, via the calculation of Adult Equivalent (AEQ) chum salmon that PSC represents, on the Coastal Western Alaska and Upper Yukon chum salmon runs. That analysis, a portion of which is contained in the introduction to Chapter 5 of this RIR, has found that the average impact rates for Coastal west Alaska (0.49%), Upper Yukon (1.26%), and Southwest Alaska (0.40%) are very low. According to ADF&G managers such low rates are unlikely to have had an impact on management considerations for these regions. Furthermore, the comparison of AEQ mortality due to chum salmon PSC with run sizes suggests that this relationship is correlated indicating that the PSC is likely related to magnitude of returns. For these reasons, the overall impact of the status quo on chum salmon stocks is considered to be insignificant as it is unlikely to jeopardize the sustainability of these stocks.

The very low impact rates identified above imply that is unlikely that in-river management would have been modified for the estimated amounts of returning AEQ chum salmon given the intricacies of in-season, in-river management. Nonetheless, the Alternatives, to the extent that they reduce salmon PSC are likely to confer a beneficial impact as the mortality of chum salmon would be reduced. Thus, the potential benefits of the Alternatives will most likely accrue as improved stock escapement and potentially improved future productivity. Given this reality, it is simply not possible to identify numbers of returning chum salmon that may be made available to subsistence, commercial, sport, or personal use anglers via the in-season management process. Consequently, it is simply not possible to quantify comparative levels of benefit that would accrue to users of the chum salmon resource under the action alternatives.

Given that this analysis cannot identify anything other than escapement and productivity benefits to chum salmon stocks the background information provided here has been limited. This treatment will highlight the current status of chum salmon subsistence harvest, by region, identify the importance of the chum salmon in the commercial harvest of Western Alaska, and will provide a brief synopsis of the present conditions in the commercial harvests of chum salmon in Western Alaska. In addition to this information, the EA contains an extensive treatment covering the management of chum salmon resources by the State of Alaska, as well as historical subsistence and commercial catch data, and a comprehensive treatment of the socioeconomic and cultural importance of the subsistence chum salmon fishery. Much of this information, especially regarding subsistence importance and use, was authored by the Alaska Department of Fish and Game.

3.1 Statewide Status of Chum Salmon Stocks

Western Alaska includes the Alaska Peninsula, Bristol Bay, Kuskokwim, Yukon, Norton Sound, and Kotzebue Sound management areas. The Nushagak, Kuskokwim, Yukon, Unalakleet, and Kobuk rivers, along with Kuskokwim Bay and Norton Sound stocks, comprise the chum salmon index stocks for this region. Most Western Alaska chum salmon stocks declined sharply in the late 1990s through the early 2000s, rebuilt rapidly with record and near record runs in the mid 2000s, and abundance has been variable since 2007.

Chum salmon stocks in areas outside of western Alaska include those found in the Aleutian Islands, Kodiak, Chignik, Upper Cook Inlet, Lower Cook Inlet, Prince William Sound, and Southeast Alaska. Escapement goals are generally comprised of stock-aggregate goals from several individual index streams. There is no escapement goal or chum salmon escapement surveys in the Aleutian Islands area.

Table 3-1 provides a summary of stock status for chum salmon stocks across Alaska in 2011. Average to above average run sizes were seen in Kuskokwim, Yukon, Kotzebue rivers as well as in the GOA, Kodiak, Chignik and Cook Inlet rivers. In Norton Sound, the eastern and northern Norton Sound chum stocks saw above average run sizes in 2011, however Northern Norton Sound remains a Stock of Yield concern. Subsistence and commercial fisheries occurred in all river systems, however the summer chum run Yukon commercial fishery was limited by low returns of Chinook salmon. Sport fisheries were allowed on all chum stocks except chum salmon in the Nome subdistrict of Northern Norton Sound. Escapement goals were met in most river systems.

Table 3-1 Statewide summary of chum salmon stock status 2011.

Chum salmon stock	Total run size?	Escapement goals met?[1]	Subsistence fishery?	Commercial fishery?	Sport fishery?	Stock of concern?
Bristol Bay	Below average	1 of 1	Yes	Yes	Yes	No
Kuskokwim Bay	Average	1 of 1	Yes	Yes	Yes	No
Kuskokwim River	Above Average	2 of 2	Yes	Yes	Yes	No
Yukon River summer run	Above Average	2 of 2	Yes	Yes, but limited by low Chinook	Yes	No
Yukon River fall run	Above average	7 of 8	Yes	Yes	Yes	No
Eastern Norton Sound	Above average	1 of 1	Yes	Yes	Yes	No
Northern Norton Sound	Above average	7 of 7	Yes	Yes	Yes, except for Nome Subdistrict	Yield concern (since 2007)
Kotzebue	Above average	No surveys in 2011	Yes	Yes	Yes	No
North Peninsula	Below average	1 of 2	Yes	Yes	Yes	No
South Peninsula	Average	4 of 4	Yes	Yes	Yes	No
Aleutian Islands	n/a	n/a	Yes	Yes	Yes	No
Kodiak	Average	2 of 2	Yes	Yes	Yes	No
Chignik	Average	1 of 1	Yes	Yes	Yes	No
Upper Cook Inlet	Above average	1 of 1	Yes	Yes	Yes	No
Lower Cook Inlet	Average	9 of 12	Yes	Yes	Yes	No
Prince William Sound	Below Average	5 of 5	Yes	Yes	Yes	No
Southeast	Below average	7 of 8	Yes	Yes	Yes	No

[1] Some aerial survey-based escapement goals were not assessed due to inclement weather or poor survey conditions.

3.2 Status of Chum Salmon Subsistence Fisheries

The first priority of the State of Alaska for management of salmon stocks is to meet spawning escapement goals in order to sustain salmon resources for future generations. The highest priority use is for subsistence under both state and federal law. Salmon surplus above escapement needs and subsistence

uses 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 various user groups. Subsistence fisheries management includes coordination with the Federal Subsistence Board and Office of Subsistence Management, which also manages subsistence uses by rural residents on federal lands and applicable waters under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA). Yukon River salmon fisheries management includes obligations under an international treaty with Canada. Salmon fisheries management in southeast Alaska also includes international obligations under the Pacific Salmon Treaty.

ADF&G, Division of Subsistence, estimates that approximately 38.3 million pounds of wild foods are harvested annually by residents of rural Alaska, representing on average 316 usable pounds per person. Communities throughout the various regions of rural Alaska rely upon various resources, based upon resource availability and customary and traditional resource use patterns (Wolfe 2004; Wolfe and Fall 2012). For example, Wolfe and Fall (2012) documented 92% to 100% of the rural households in Arctic, Interior, Western, and Southwestern Alaska use fish, while only 75% to 86% of households actually harvest fish, which testifies to the importance of sharing within subsistence-based economies. Similarly, based upon an analysis of comprehensive data on wild resource harvests from the 1980s 1990s, and 2000s, ADF&G found that on average, fish (mostly salmon) represent 55% of the total subsistence harvests by rural residents, followed by land mammals (22%), marine mammals (13%), wild plants (4%), birds (3%), and shellfish (93%).

Annual per capita subsistence harvest rates range from 436 pounds of wild foods per person in Arctic communities to 370 pounds per person in rural Interior Alaska communities, to 490 pounds per person among Yukon-Kuskokwim Delta communities. Average per capita harvests in Bristol Bay/Aleutians area is estimated at 212 pounds per person (Wolfe and Fall 2012).

The BOF has made ANS findings for salmon throughout the areas under discussion here (Table 3-2). These findings provide a perspective on the importance of salmon harvests to subsistence economies of rural Alaska, given that they were based upon historical harvest patterns within each fisheries management area.

The number of summer chum salmon harvested for subsistence from the Yukon River has fallen below the lower limit of the ANS five times between the years 1998 and 2010. Similarly, fall chum salmon harvests have fallen below the lower limit of the ANS ten times between 1998 and 2010. Yukon River coho salmon harvests have fallen below the lower limit of the ANS seven times between the years 1998 and 2010. Chinook salmon harvests from the Yukon River drainage have fallen below the lower limit of the ANS five times between the years 1998 and 2010. Some of the reasons for not meeting an ANS threshold in a given year may include poor salmon abundance for that year, or a decline in commercial chum salmon harvest opportunity in an effort to preserve Chinook salmon numbers (personal communication, C. Brown, 2010). In years of poor salmon abundance, restrictions or closures to the subsistence fishery to achieve adequate escapements reduced harvest success and likely resulted in the lower bound of ANS ranges not being achieved. However, it should be noted that in some years when ANS was not achieved, total summer chum, fall chum, and coho salmon runs were adequate to provide for subsistence harvests and no additional restrictions were in place on the subsistence fishery, suggesting that in those years, factors other than salmon abundance or management were largely responsible for low subsistence harvests.

Table 3-2 Alaska Board of Fisheries Findings pertaining to non-Chinook salmon amounts reasonably necessary for subsistence findings

Fisheries Management Area	Year of ANS Finding	Chum Salmon	Summer Chum Salmon	Fall Chum Salmon	Sockeye Salmon	Coho Salmon	Salmon
Kotzebue	1993	-	-	-	-	-	43,500
Norton Sound-Port Clarence	1998	-	-	-	-	-	96,000-160,000
Nome Subdistrict	1999	3,430-5,716	-	-	-	-	-
Yukon River	2001	-	83,500-142,192	89,500-167,900	-	20,500-51,980	-
Kuskokwim River	2001	39,500-75,500	-	-	27,500-39,500	24,500-35,000	-
Remainder of Kuskokwim Area	2001	-	-	-	-	-	7,500-13,500
Bristol Bay	2001[6]	-	-	-	55,000-65,000[7]	-	157,000-172,171
Alaska Peninsula	1998	-	-	-	-	-	34,000-56,000

3.2.1 Mixed Economy

In the 20th century, most rural Alaska Native communities transitioned from predominantly local, subsistence-based economies to mixed economies, in which residents relied a combination of local subsistence harvests, on wage labor, and on transfer payments like the Alaska Permanent Fund Dividend (Goldsmith 2007 *Remote Rural Economy of Alaska*). In the latter half of the 20th century, rural Alaska experienced dramatic improvements in infrastructure – transportation, utilities, communications, education, health care – funded by state revenue from oil development, by expanded federal programs, and by successful Alaska Native regional corporations. As a result, employment, personal income, and mobility increased substantially. Rural living standards improved substantially in the latter 20th century. For the first time, many rural Alaska residents had means to travel to, and in some cases, relocate in regional centers and urban areas of the state.

Nonetheless, rural Alaska still presents an economic environment distinctly different from other states in the U.S. The majority of the population is Alaska Native, living in small, isolated villages. There are few road connections between villages and the primary transportation connection with the state's cities is by air. This region has a large subsistence economy in which residents provide a significant share of their real income through hunting, fishing, and harvesting local wild products (Huskey et al., 2004). Rural hub communities of Dillingham, Bethel, Nome, Kotzebue, and Barrow are the locus of many wage jobs and are regional service centers for health services, retail stores, government agencies, and transportation. They have regular service from scheduled aircraft and receive shipments of goods and equipment by

[6] The current ANS finding for Bristol Bay dates to 2001, with the embedded Kvichak sockeye ANS. The finding for all salmon for the entire area dates to 1993.

[7] The ANS finding for Bristol Bay sockeye salmon represents a nested ANS finding for the Kvichak river drainage, from the overall Bristol Bay area finding of 157,000-172,171 salmon (5 AAC 01.336(b)(1)).

barge during summer months (Caulfield, 2002; see also Fall et al., 1986; Magdanz and Olanna 1986; Wolfe et al., 1986).

For most families, making a living on the Yukon River requires integration of subsistence activities with wage employment, commercial fishing, or other types of money-making activities (e.g., furbearer trapping). At a household level, these two components of the mixed economy are often combined by family members. Income produced by family members typically pays for the equipment and fuel used in the production of wild foods (Wolfe, 2009). Cash enables household members to purchase boats, outboard motors, rifles, and fishnets. With these, people living in rural Alaska are able to procure and consume traditional foods (Caulfield, 2002). Cash may also be used to pay for housing, utilities, transportation, and a variety of other goods and services.

In a mixed economy, people often move to improve their employment opportunities. Improving job opportunities and the chance of finding work were the reason most frequently cited for moving among inter-community migrants on Alaska's North Slope and for Native migration within and into the Canadian Northwest Territories (Huskey et al., 2004). A study conducted by the Institute of Social and Economic Research also found that the pursuit of economic and educational opportunities appears to be the predominant cause of migration. Rural Alaska (all communities state-wide) net migration shows an increase in net out-migration from about 1,200 per year during the period 2002 - 2005 to about 2,700 per year in 2006 and 2007 (Martin et al., 2008).

Place amenities, such as public and environmental goods, influence patterns of migration. The subsistence economy in rural North Alaska provides a good example of the interaction of culturally defined preferences and place amenities in migration. Subsistence activities, such as hunting, fishing, and gathering, add substantially to the real income of rural Natives. Subsistence may limit the effect of relative market opportunities on Native migration (Huskey et al., 2004).

In Alaska, conventional economic opportunities (employment, growth, education) are concentrated in Anchorage and Fairbanks. Many rural Alaskans have moved to cities to take advantage of these opportunities. Yet most rural people are heavily invested in rural subsistence economies by virtue of their local knowledge and social capital. For those who stay in rural Alaska, these investments provide significant non-cash returns that improve the quality of their lives. For those who move to unfamiliar urban environments, these local investments provide no return whatsoever and will gradually atrophy, making it increasingly difficult to return home (see Huskey et al., 2004).

Migration between village and town (dual residencies) and seasonal moves for employment and subsistence fishing has become a well-established pattern for some villages along the Yukon River. Poor prospects for local employment pushes families away from a village, while traditional pursuits like subsistence fishing tend to pull them back. Low salmon runs and restricted subsistence fishing time are contributing factors to increased mobility and migration in order to be more economically productive. In the past people could make a living along the Yukon River (Wolfe, 2009). When villages become too small, maintaining a local public school and other facilities becomes problematic.

The cash sector appears to be the weaker of the two economic sectors. As a general rule, households struggle to find ways to make enough money to enable them to live in rural communities where costs of living are already high. Wage-paying jobs tended to be scarce, seasonal, and intermittent and finding employment in the private sector is difficult. In villages along the Yukon River, the percentage of adults who earn some money through employment ranges from 50% to 80%. Mean household income (earned and unearned sources) in 2007 ranged from $27,286 to $38,936. On a per capita basis, total incomes from earned and unearned sources ranged from $6,357 per person to $14,807 per person. This is substantially

lower than the per capita incomes in Alaska's urban areas at $24,525 per person in Fairbanks and $20,166 per person in Anchorage (based upon 2000 U.S. Census) (Wolfe, 2009).

3.3 Status of Commercial Chum Salmon Fisheries of Western Alaska

This section provides information on current conditions in the commercial chum salmon fisheries in western Alaska river systems likely most affected by BSAI chum salmon PSC. The information is presented by ADF&G management region and is focused on the regions that contribute to the western Alaska stock of chum salmon. The date provided in Table 3-3 is compiled from data provided by ADF&G in response to a special data request and much of this data can be found in the 2011 season summaries that are available on the ADF&G website. Following the table are discussions, by region, that summarize this information and provide some in-season context as available in the season summaries.

Table 3-3 Comparison of 2011 Commercial Chum Salmon Harvest and Value with Historic Averages.

Fisheries Management Area	2011 Chum Catch	2011 Chum Value	% of Total Value	10 Year Av. Catch	10 Year Av. Value	Historic High Catch
Kotzebue	264,321	$867,085	100%	135,903	$343,152	677,239 (1981)
Norton Sound-Port Clarence	110,555	$1,269,730	42%*	33,446	$420,720	319,437 (1983)
Yukon River Summer Run	275,161	$1,314,369	86%	121,178	$83,886	1,616,682 (1988)
Yukon River Fall Run	238,979	$1,627,575		84,625	$417,310	477,736 (1981)
Kuskokwim River	118,256	$350,124	46%	46,742	$65,492	1,318,647 (1988)
Remainder of Kuskokwim Area	118,150	$682,835	45%	66,329	$120,347	133,524 (2010)
Bristol Bay	739,052	$137,726	1%	1,260,238	$105,042	2,243,569 (2006)
Alaska Peninsula	1,273,171	$3,827,580	15%	1,041,821	$1,170,970	2,451,338 (1984)

Kotzebue Area

The 2011 Kotzebue Sound commercial chum salmon fishery opened on July 11 and closed after the August 31 fishing period. Similar to 2010, there was a very strong run of chum salmon, but commercial fishing was limited, particularly in August, because of runway closures due to construction. The runway closures limited the buyer's ability to ship the catch to the processing facility in Anchorage (ADF&G 2011c).

The overall chum salmon run into Kotzebue Sound in 2011 was estimated to be above average to well above average based on commercial harvest rates, subsistence fishermen reporting good catches, and the Kobuk test fish index being the second highest in the nineteen year project history. The commercial harvest of 264,321 chum salmon was the second highest since 1995 and the 89 permit holders fishing was the largest number since 1995. The total ex-vessel value is more than double the ten year average; however, historic high catch of 677,239 chum salmon is also more than double current catch levels. The

proportion of total value attributable to chum salmon in this region is 100 percent as this is effectively only a chum salmon fishery.

Norton Sound

The 2011 chum salmon harvest of 110,555 for the Norton Sound District ranks 19th best in 51 years of commercial chum salmon harvests and was three times greater than the recent ten year average. 2011 also marks the first time in 24 years that there have been consecutive years with harvest exceeding 100,000 chum salmon. However, historic high catches were nearly three times larger than the 2011 catch. The value of the 2011 catch was $1.3 million and is more than three times higher than the 10 year average and was 42 percent of total salmon fishery value. Of note; however, is that while these numbers are showing strong improvement in most areas of the District, the Nome Subdistrict remains closed to commercial salmon fishing and had no commercial chum salmon catch in 2011.

Kuskokwim River, Kuskokwim Bay

Throughout the Kuskokwim Area, in 2011, chum salmon abundance was above average while sockeye salmon abundance was below average, coho salmon ranged from above to below average and Chinook salmon abundance was poor. Kuskokwim River Chinook and sockeye salmon run timing was near average, while chum salmon runs were three days later than average and coho were three days earlier than average.

There were two registered buyers in the Kuskokwim Area in 2011 and processing capacity was adequate to purchase harvested fish. The 2011 Kuskokwim River harvest of 118,256 chum salmon was more than double the ten year average and produced more than five times the ten year average value with $350,124 earned. Kuskokwim River chum harvest value represented 46 percent of total commercial value in the region. However, the 2011 harvest was also considerably lower than the historic high harvest of 1.3 million fish, which occurred in 1988.

The 2011 Kuskokwim Bay harvest of 118,256 chum salmon was more than double the ten year average and produced more than five times the ten year average value with $682,835 earned. Kuskokwim Bay chum harvest value represented 45 percent of total commercial value in the region. The 2011 harvest was also quite close to the historic high catch of 133,524, which occurred in 2010. These data show a strong resurgence in the Kuskokwim Bay salmon fisheries in recent years as run strength, buyer availability, and basic fishing infrastructure have improved. However, current chum salmon harvest in the Kuskokwim area remains below historic high levels.

Yukon River

Due to uncertainty concerning the 2011 Chinook salmon run strength and in an effort to reduce incidental harvest of Chinook salmon during a poor run the summer chum fishery was delayed until late June and restricted to 6 inch mesh nets. The 2011 Yukon summer chum catch of 275,979 was more than double the 10 year average and generated more than $1.3 million in revenue, which was 15 times the ten year average real value. In total, chum salmon represent 86 percent of the salmon revenue on the Yukon. However, historic catches of Yukon summer chum exceeded 1.6 million fish in 1988, thus current catches are considerably lower than historic high levels.

The Yukon River fall chum fishery had a 2011 catch of 238,979 chum salmon, which is nearly three times the ten year average catch. The Yukon fall chum harvest generated more than $1.6 million in revenue which was almost four times the ten year average value. However, historic high catches of Yukon fall chum were 477,736 fish in 1981. Thus, current fall chum catch is about half of the historic high catches.

Bristol Bay

The Bristol Bay salmon fishery is primarily a sockeye salmon fishery. In 2011, for example, 21.9 million sockeye salmon were taken commercially in the Bristol Bay area. In contrast, 739,052 chum salmon were taken commercially in Bristol Bay in 2011. The 2011 Bristol Bay chum salmon catch was more than 40 percent smaller than the ten year average and considerably below the historic high catch of 1.3 million fish, which occurred in 1988. Despite this, the 2011 chum commercial value was higher than the ten year average value with $137,726 earned and the increased value with a smaller catch is likely due to improved markets and price increases in recent years. The 2011 Bristol Bay harvest value represents only one percent of the total gross value of the Bristol Bay salmon fisheries.

Alaska Peninsula

Alaska Peninsula salmon fisheries tend to be dominated by large Sockeye and Pink salmon harvests. Alaska Peninsula chum salmon harvests were nearly 1.3 million fish in 2011 and exceeded the ten year average by more than 200,000 fish. The 2011 chum salmon value was $3.8 million and was more than three times larger than the ten year average value. The 2011 chum value was 15 percent of overall salmon value due to larger harvests of sockeye and pink salmon. Historically, Alaska Peninsula chum harvests have exceeded 2.2 million fish (2006).

3.4 Identification of Regions and Communities Principally Dependent on Commercial Fisheries

This section utilizes date on chum salmon catch and value, by permit holders, to analyze the importance of chum salmon in the areas of Western Alaska most likely affected by the alternatives in question. In addition, a substantial body of analysis has been conducted by the Alaska Department of Labor, Workforce Development Division (ADOLWD) in creating their seafood industry profiles. These ADOLWD profiles provide information on the importance of various commercial fisheries, including salmon and pollock, to regions of Western Alaska. What is provided here is a summary of those profiles and it is intended to provide context of the relative importance of commercial fisheries, both for salmon and pollock, in regions and communities throughout Western Alaska.

3.4.1 Importance of Commercial Chum Salmon Revenue to Western Alaska Limited Entry Permit Holders

The importance of chum salmon varies by the region of Western Alaska in which commercial salmon fishermen live and by the fisheries in which they participate. It is important to note that this treatment specifically considers chum salmon as opposed to the aggregation of all other non-Chinook salmon that comprise the non-Chinook PSC. This is because nearly all of the non-Chinook salmon in the PSC are chum salmon; however, large commercial catches of sockeye salmon occur in many areas of western Alaska. In some cases sockeye salmon catch dwarfs chum salmon catch (e.g. Bristol Bay). Thus inclusion of sockeye salmon in an aggregate non-Chinook revenue analysis would drastically overstate the relative importance of non-Chinook salmon versus that of chum salmon, which comprise nearly all of the non-Chinook PSC. For this reason, this analysis specifically reports the importance of revenue earned from chum salmon by limited entry permit holders residing in Western Alaska in order to identify relative dependence on the species of fish that comprises nearly all of the PSC that the action alternatives seek to address.

Table 3-57 and Table 3-58 summarize information on the importance of chum salmon revenues for western Alaskan permit holders. Table 3-57 shows the percentage of the gross revenues earned by State of Alaska limited entry permit holders who live in a particular western or interior Alaska census district

from salmon limited entry fisheries in western Alaska. Table 3-58 shows the average revenues per person fishing received by these permit holders.

Table 3-57: Percent of commercial salmon revenue from western Alaska salmon fisheries accruing to permit holders resident in different Alaska census districts that is attributable to chum harvests (source: AKFIN)

	Aleutians east	Aleutians west	Bethel	Bristol Bay	Dillingham	Lake and Peninsula	Nome	Northwest	Wade Hampton	Yukon-Koyukuk
1991	11%	6%	16%	2%	4%	2%	24%	91%	15%	61%
1992	6%	13%	11%	1%	3%	1%	17%	84%	6%	52%
1993	7%	8%	4%	0%	3%	1%	13%	80%	4%	41%
1994	14%	4%	6%	0%	3%	1%	3%	68%	2%	43%
1995	9%	5%	11%	0%	3%	1%	9%	89%	8%	72%
1996	4%	1%	4%	0%	1%	0%	2%	56%	4%	69%
1997	4%	2%	3%	0%	1%	1%	8%	71%	3%	29%
1998	3%	2%	7%	0%	1%	1%	3%	64%	1%	4%
1999	3%	1%	2%	0%	1%	0%	6%	66%	1%	3%
2000	7%	2%	1%	0%	1%	0%	4%	73%	1%	9%
2001	16%	4%	3%	0%	5%	2%	18%	86%		31%
2002	11%	3%	5%	0%	4%	1%	2%	37%	0%	9%
2003	8%	0%	2%	0%	2%	1%	4%	47%	0%	5%
2004	5%	0%	2%	0%	2%	0%	4%	51%	0%	3%
2005	4%	1%	2%	1%	3%	0%	2%	67%	15%	13%
2006	12%	2%	2%	1%	3%	1%	2%	61%	8%	14%
2007	6%	2%	2%	1%	3%	1%	5%	54%	15%	17%
2008	6%	9%	3%	1%	3%	4%	5%	77%	60%	42%
2009	13%	8%	5%	1%	3%	3%	7%	80%	87%	17%
2010	20%	8%	9%	1%	2%	7%	41%	92%	55%	22%
2011	17%	11%	28%	1%	3%	3%	42%	94%	86%	16%

Table 3-58 Average commercial salmon revenue from western Alaska salmon fisheries accruing to permit holders resident in different Alaska census districts that is attributable to chum harvests; nominal dollars per year (Source: AKFIN)

	Aleutians east	Aleutians west	Bethel	Bristol Bay	Dillingham	Lake and Peninsula	Nome	Northwest	Wade Hampton	Yukon-Koyukuk
1991	$8,140	$2,269	$1,212	$432	$1,114	$868	$1,076	$4,045	$1,911	$4,861
1992	$8,822	$5,122	$1,228	$258	$1,215	$1,029	$1,120	$4,130	$920	$3,996
1993	$6,349	$1,885	$394	$107	$1,103	$337	$607	$1,964	$342	$1,777
1994	$12,510	$1,085	$697	$165	$1,026	$587	$230	$2,256	$123	$3,612
1995	$10,674	$2,558	$1,157	$166	$1,151	$932	$475	$3,321	$718	$8,716
1996	$1,932	$330	$320	$88	$515	$89	$70	$1,039	$269	$7,040
1997	$2,313	$458	$102	$26	$146	$255	$330	$2,483	$227	$1,404
1998	$2,693	$720	$343	$43	$169	$274	$115	$1,488	$41	$361
1999	$2,967	$683	$102	$95	$252	$202	$152	$2,938	$106	$194
2000	$4,375	$1,050	$70	$41	$206	$140	$124	$3,762	$14	$680
2001	$5,318	$2,300	$79	$62	$593	$903	$329	$4,525		$7,851
2002	$3,810	$964	$88	$32	$296	$465	$21	$1,558	$8	$434
2003	$3,459	$55	$88	$71	$333	$270	$90	$3,839	$16	$224
2004	$3,851	$139	$105	$36	$381	$39	$186	$1,358	$19	$344
2005	$3,516	$405	$119	$173	$704	$106	$185	$2,790	$647	$1,840
2006	$9,321	$798	$148	$317	$948	$540	$174	$5,291	$523	$1,629
2007	$5,750	$1,037	$127	$324	$906	$926	$467	$4,976	$668	$2,521
2008	$9,096	$9,352	$247	$210	$1,114	$3,027	$594	$7,720	$1,822	$5,261
2009	$15,511	$7,809	$465	$254	$1,005	$2,897	$879	$5,876	$1,628	$3,345
2010	$11,836	$10,180	$762	$391	$910	$6,913	$4,135	$12,654	$1,884	$3,488
2011	$17,599	$10,723	$1,932	$356	$725	$3,698	$918	$9,582	$6,679	$3,760

These tables are meant to be indicative of the importance of chum salmon and suggest that commercial chum salmon harvest income is most important for persons living in the following census districts:

- Northwest: chum salmon revenues have historically provided the vast majority of all commercial salmon revenues in this census area. In 2010, 92 percent of all commercial salmon revenue earned in the Northwest Alaska census area was derived from chum salmon. In 2011, chum salmon accounted for 94 percent of total revenue. However, the 2011 average revenue of $9,582 was lower than the $12, 654 earned in 2010.

- Wade Hampton: Although not historically a consistent source of revenue in this census area, chum salmon harvests in the most recent three years have provided the majority of revenue and as much as 86 percent of total commercial salmon revenue, in 2011. The 2011 average commercial chum salmon revenue earned by limited entry permit holders from this census was a period high of $6,679, which is more than triple the values observed in any of the three years prior to 2011.

- Aleutians East: chum salmon revenues accounted for between 3 percent and 20 percent of the revenues earned by permit holders in the Aleutians East census district over the period 1991-2010, with 2010 recording the period high of 20 percent. In 2011 chum revenue was 17 percent of total salmon revenue and recorded a period high of average revenues of $17,599 per permit holder.

- Yukon-Koyukuk: chum salmon revenues accounted for a majority of all salmon revenue earned in the area in several years in the 1990s. With the decline in the Yukon River chum runs through the early 2000s the proportion of revenue attributable to chum salmon declined but had rebounded to 42 percent in 2008 as Chinook stocks declined. Since then the chum value for resident permit holders has declined and was 16 percent of total salmon value in 2011 representing $3,760 in average revenue per permit holder.

- Nome: chum salmon revenues accounted for between 2 percent and 42 percent of the revenues earned by persons operating in the Nome census district. Average revenues ranged from $70 to $4,135 (2010), with the largest percentage and average revenue occurring in 2011.

- Aleutians West: chum salmon revenues accounted for between 0 percent and 13 percent of the revenues earned by persons operating in the Aleutians West census district. Average revenues ranged from $55 to $10,723, with the largest average revenue occurring in 2011.

- Dillingham and Bristol Bay: These census areas tend to have relatively small amounts of chum salmon commercial revenue owing to the greater importance of commercial sockeye fisheries in the Bristol Bay area. Nonetheless, the Dillingham census area recorded average commercial chum salmon revenue exceeding $1,000 in several recent years as well as historically.

- Bethel: chum salmon revenues accounted for between 1 percent and 28 percent of the revenues earned by persons residing in the Bethel census district. Average revenues ranged from $70 to $1,932, with the largest average revenue occurring in 2011. In recent years, chum salmon revenue, as a percent of total revenue, has increased from as low as 2 percent to 28 percent in 2011.

- Lake and Peninsula: chum salmon revenues accounted for between 0 percent and 7 percent of the revenues earned by persons operating in the Lake and Peninsula census district, with the largest percentage occurring in 2010. Average revenues ranged from $39 to $6,918, with the largest average revenue occurring in 2010. In recent years, chum salmon revenue, as a percent of total revenue, has increased from as low as 1 percent to 7 percent in 2010. The average revenue of $6,918, in 2010, was the largest during the period of 1991-2011.

3.4.2 Western Alaska Seafood Industry Profiles Summary

In addition to the census area level chum salmon revenue data presented above, the Alaska Department of Labor and Workforce Development (ADOLWD) maintains, presently through 2009, an extensive analysis of fish harvesting employment, gross earning, and seafood processing employment and earning participation, by ADOLWD defined region. The ADOLWD analysis is available on their website in its entirety. However, the analysis combines all salmon species and does not provide information specific to chum salmon. Nonetheless, the information provided by ADOLWD will be used here to show the relative importance of salmon in the seafood harvesting and processing industry of Western Alaska. ADF&G commercial harvest and value information, specifically the proportion of commercial value attributable to chum salmon, also will be provided below to highlight ADF&G management areas with high dependence on the chum salmon resource.

Northern Region

The ADOLWD Northern Region includes the communities, Boroughs, and Census areas associated with the fisheries of the Kotzebue, Norton Sound, and part of the upper Yukon River. Overall, in the Northern Region, 410 crew licenses were purchased in 2009 with about half of these coming from the Nome census area. Overall, in the Northern Region, 264 permit holders were active in 2009 with 193 of these coming from the Nome Census area. ADOLWD estimates that 199 of those permits were used in local fisheries in 2009. The largest proportions of the total estimated harvest workforce and earnings in the Northern Region have historically come from the salmon fisheries (gillnet and set-net combined, $1.1 million in 2009). Salmon harvesting gross gillnet revenue declined substantially during the late 2000s; however, set-net revenue improved considerably during that time frame. Norton Sound pot fishing for crab is the other major source of harvesting gross earnings in the region and accounts for nearly half of the total value, or $1.3 million, in 2009. Income from fishery participation is widely spread among many communities in the region; however, none of the communities in the region have gross earnings of resident permit holders that exceed $1 million.

Northern Region fish harvesting employment, by species and month, is also tabulated by ADOLWD. Given the prevalence of the salmon fisheries in overall employment in the region, it is not surprising that harvesting employment tends to be dominated by the salmon industry and is greatest in the summer months of June, July and August. In 2009, for example, 394 individuals were engaged in fish harvesting activity in August with 304 engaged in salmon harvesting employment. In contrast, the monthly average number of harvesting employment positions in all fisheries combined was 87 in 2009.

As of 2009, there were no processing facilities in the Kotzebue area; however, Norton Sound Economic Development Corporation has filed intent to operate processing facilities in Nome, Unalakleet, and Savoonga. ADOLWD also identifies processing facilities registered to operate in Tanana, Kaltag, Manley Hot Springs, Fairbanks, and North Pole. Note; however, that these data do not include any floating processors or buying stations that may be in operation in the region. The total processing worker count in the Northern Region seafood processing sector declined continuously from 189 processing workers in 2000 to 20 in 2004 and has rebounded somewhat to 68 in 2009. Income earned in this region cannot be presented due to State of Alaska confidentiality restrictions.

Yukon Delta Region

The ADOLWD Yukon Delta Region includes the communities, Boroughs, and Census areas associated with the fisheries of the lower Yukon and Kuskokwim River areas. Overall, in the Yukon Delta region 1,086 crew licenses were purchased in 2009; however nearly three times that many crew participated in the area's fisheries. Overall, in the Yukon Delta Region 1,038 local resident Alaska permit holders were active in 2009 with 987 of these having fished in the region. The vast majority of Yukon Delta region total estimated harvesting workforce has historically been employed in the salmon fisheries where 2,517 positions of a total of 3,020 positions were supported in 2009. Salmon based employment revenue; however, was about a third of the total with about $2.2 million in 2009 as compared to the region total of nearly $6 million. This disparity may be due to earnings of harvesting workers in the much higher valued halibut and herring fisheries. Resident permit holder salmon fishery gross earnings by community, as tabulated by ADOLWD, are spread throughout many communities in both the Wade Hampton and Bethel Census Areas; however, none of the communities in the region have gross earnings of resident permit holders that exceed $1 million from the salmon fisheries.

Yukon Delta region fish harvesting employment, by species and month, is also tabulated by ADOLWD. Similar to the Northern Region, harvesting employment is dominated by the salmon industry and is greatest in the summer months of June, July and August. In 2009, for example, salmon employment represented between 82 percent and 90 percent of total harvesting positions from June through August. Groundfish, halibut, and herring fisheries also provide harvesting employment in the region. Of note is that there is little or no fish harvesting employment in the region from October through April. Thus, all fish harvesting related income occurs from May through September.

As of 2009, there were as many as 10 canneries and land based seafood processors in the Yukon Delta Region. Since then; however, local fish processing infrastructure have been expanded through investments by the CDQ entities (e.g. CVRF's Platinum Plant) in the region. However, these data do not include any floating processors or buying stations that may be in operation in the area. The total seafood processor worker count in the Yukon Delta Region seafood processing sector declined during the early 2000s as commercial harvests declined, but rebounded to a period high in 2009 with 831 total workers. Non-resident workers have made up a relatively small proportion of about 5 percent in recent years. Seafood processing wages are estimated to have been approximately $1.8 million in 2005 and have increased steadily to $4.7 million in 2009, with non-resident wages accounting for 22 percent of the total in 2009. As in the Northern region, percent of non-resident wages is higher than percent of non-resident workers and indicates relatively higher wages for non-resident workers.

Bristol Bay Region

The ADOLWD Bristol Bay region communities, Boroughs, and Census areas associated with the fisheries of Bristol Bay including those in the Dillingham census area and the Lake and Peninsula Borough. Overall, in the Bristol Bay Region 878 crew licenses were purchased in 2009; the majority of licenses, 587, were purchased by Dillingham residents. Given the large scale of the Bristol Bay

commercial Sockeye salmon fishery it is not surprising that the regions harvest employment total, which is an estimate of the total number of crew members participating in the fishery, is much larger (4,715 in 2009) than the local resident crew counts. This indicates that non-resident crew participation in the Bristol Bay fishery is about five times more than resident crew participation.

The crew counts shown above are in addition to limited entry commercial salmon permits that are actively used in the area's fisheries. Overall, in the Bristol Bay Region, 603 resident permit holders and a total of 2,335 permit holder were active in 2009. The town of Dillingham recorded total gross earnings by resident permit holders of between $5 million and $10 million in 2009, while Togiak, Naknek, and King Salmon all recorded values of between $1 million and $5 million. Several other communities reported values less than $1 million.

ADOLWD has also tabulated data on fish harvesting employment and earning by gear type in the Bristol Bay Region. Since 2003, salmon fishery harvesting workforce in the Bristol Bay Region has stayed relatively constant, while gross earnings have steadily increased. In 2009, total workforce is estimated to have been 9,416 and total gross earnings are estimated to have been about $133 million the vast majority of which is earned in the sockeye salmon fishery.

Salmon fisheries dominate overall fish harvesting employment in the Bristol Bay region, with the greatest employment in the summer months of June and July. In 2009, for example, 6,768 individuals were engaged in fish harvesting activity in July as compared to the monthly average of 1,161. Halibut and herring fisheries provide most of the remaining harvesting employment in the region. Of note is that there is little or no fish harvesting employment in the region from October through March. Thus, all fish harvesting related income occurs from April through September.

There are many fish processing facilities floating processors and buying stations in operation in the Bristol Bay area, primarily to support the sockeye salmon fishery. The total worker count in the Bristol Bay Region seafood processing sector has trended upward in the late 2000s. In 2009, the area's fisheries supported 4,522 seafood processing workers. Overall wages have increased steadily since 2003, with a period high of $31 million in total wages estimated for 2009.

Non-resident workers have made up a substantial proportion of the Bristol Bay Region workforce and accounted for approximately 87 percent in 2009. Bristol Bay Non-resident wage percentages have historically been close the overall percentages of non-resident workers. Thus, wages of non-resident workers do not appear to be much higher than wages of resident workers.

Aleutian and Pribilof Islands Region

The ADOLWD Aleutian and Pribilof Islands Region includes the communities, boroughs, and census areas associated with the fisheries of the Bering Sea and Aleutian Islands, including fishing communities in the Aleutians East Borough. Overall, in the Aleutian and Pribilof Islands Region, 4,239 commercial crew licenses were purchased in 2009, with 626 purchased by local residents the three boroughs in the region. In total, 1070 Alaska fishing permits were fished in the region in 2009, with 292 fished by local residents.

ADOLWD has also tabulated data on fish harvesting employment and earnings by gear type in the Aleutian and Pribilof Islands Region. The largest proportions of the total estimated workforce in this region have come from the Pot and longline fisheries with 1,471 and 1,995 employed in 2009, respectively. In terms of earnings the pot fisheries dominate total earnings, with $186 million in 2009, while the trawl fisheries and longline fisheries earned $159 million and $53 million respectively. The

trawl fisheries have the highest proportions of 2009 non-resident earnings in (92 percent) followed by the pot (79 percent) and longline fisheries (48%).

Salmon fisheries (gillnet, seine, and set-net combined), while having lower overall value, contribute substantially to the overall workforce and generally have greater local resident participation. The salmon fisheries of the region generated more than $36 million in revenue in 2009 and employed approximately 1,550 harvesting workers. The proportion of revenue earned by non-residents in salmon harvesting in the region in 2009 was 50 percent in the gillnet fleet, 20 percent in the seine fleet, and 9 percent in the set net fleet.

Unlike other ADOLWD regions, fish harvesting employment in the Aleutian and Pribilof region tends to be dominated by the groundfish fisheries, including but not limited to the pollock fishery, and is spread across all months of the year. Groundfish harvesting employment is greatest in the A season months of January, February and March. In 2009, for example, there were 1,148, 1,806, and 1,598 total fish harvesting jobs in the region in each of the first three months of the year, respectively, most of which were in the groundfish fisheries. Similar to other regions, maximum harvesting employment is observed in the summer months of June, July, and August when salmon harvesting jobs are greatest. In 2009, for example, there were 2,267, 2,416, and 2,618 total fish harvesting jobs in the region in June, July, and August, respectively. The majority of summer employment in fish harvesting comes from the salmon fisheries.

The Aleutian and Pribilof Islands Region is home to some of the largest fish processing facilities in existence. In 2009, there were five registered processing facilities operating in Dutch Harbor-Unalaska, which has the largest port landings total in the region. Akutan also has a large processing facility and additional facilities were registered to operate in 2009 in Adak, Atka, Saint Paul, False Pass, Cold bay, King Cove, and Sand Point. Total worker count in the Aleutian and Pribilof Islands Region seafood processing sector has ranged from 7,041 in 2004, to a high of 8,236, in 2006, before falling to 6,276 in 2009. The decline in total seafood processing worker count in the late 2000s is likely related to the decline in pollock harvests. Non-resident workers have made up a large proportion of the region's workforce, more than 75 percent in all years. Total processing workforce wages in the Aleutian and Pribilof Islands Region were a period high of $129 million in 2006, slightly more than three quarters of which were earned by non-residents.

The information on employment, participation, and wages presented above for the ADOLWD Aleutian and Pribilof Islands Region is intended to provide an indication of the scale of fishing activity in the region as well as documentation of the relative importance of groundfish and salmon fisheries to the region. The boroughs and communities most likely affected by the proposed action on the pollock fishery are also identified. While a direct linkage of impacts of the alternatives on employment, both shoreside and among vessel crew, and on expenditures within communities dependent on these fisheries is not possible with presently available information, this information is intended to provide a qualitative treatment of the scale of the fishery activity within dependent communities. This information shows that the Aleutian and Pribilof Islands Region supports diverse commercial fishing activity inclusive of pot, longline, trawl and salmon fisheries upon which considerable numbers of local residents and non-residents depend.

4.0 Description of the Alternatives

Chapter 2 of the accompanying Environmental Assessment (EA) contains a thorough treatment of the various alternatives under consideration. A synopsis of that extensive treatment appears here.

This analysis is focused on alternative measures to minimize chum (non-Chinook) salmon PSC in the Bering Sea pollock fishery. This chapter provides a brief description of the following four alternatives:

Alternative 1: Status Quo (No Action)

Alternative 2: Hard cap

Alternative 3: Triggered closure with intercooperative exemption

Alternative 4: Triggered closure with intercooperative exemption and options for non-exempt closures

The alternatives analyzed in this environmental assessment and the Regulatory Impact Review (RIR) represent a complex suite of components, options, and sub options. However, each of the alternatives involves a limit or "cap" on the number of non-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 non-Chinook salmon PSC cap was reached even if a portion of the pollock total allowable catch (TAC) has not yet been harvested. The components and options of Alternatives 2 and 4 represent a change in management of the pollock fishery because if the non-Chinook salmon prohibited species catch (PSC) limits are reached before the full harvest of the pollock allocation, then directed fishing for pollock must stop either throughout the entire Bering Sea or for a specific time frame. Under Alternative 3, like Alternative 1, reaching the cap closes specific areas important to pollock fishing unless participants are parties in a rolling hot spot closure system approved by NMFS. Note that the alternatives are not mutually exclusive and mixing and matching of components of each may be done to create a combined management approach which would represent a new alternative.

4.1 Alternative 1: Status Quo

Alternative 1 retains the current program of Chum Salmon Savings Area (SSA) closures in the Bering Sea triggered by separate non-Community Development Quota (non-CDQ) and CDQ non-Chinook salmon PSC limits, along with the exemption to these closures by pollock vessels participating in a Rolling Hot Spot intercooperative agreement (RHS ICA) approved by NMFS. The RHS ICA regulations were implemented in 2007 through Amendment 84 to the BSAI FMP. The regulations were revised in 2011 to remove those provisions of the ICA that were for Chinook PSC management given the new program in place under Amendment 91. Closure of the Chum SSA is designed to reduce the total amount of chum incidentally caught by closing areas with historically high levels of salmon PSC. The RHS ICA operates in lieu of regulatory closures of the Chum SSA and requires industry to identify and close areas of high salmon PSC and move to other areas. Only vessels directed fishing for pollock are subject to the Chum SSA closure and ICA regulations. The ICA for 2011 and the list of vessels and CDQ groups participating in it are appended to the EA (Appendix 2). See Chapter 2 of the EA for an extensive treatment of the components of Alternative 1.

4.2 Alternative 2: Hard Cap

Alternative 2 would establish separate chum salmon PSC caps for the pollock fishery in the B season. When the hard cap is reached, all directed fishing for pollock must cease for either the remainder of the year (Option 1a) or until August 1 (Option 1b). Only those non-Chinook salmon caught by vessels participating in the directed pollock fishery would accrue towards the cap. When the cap is reached, directed fishing for pollock would be prohibited during the applicable time frame.

Alternative 2 contains components, and options for each component, to determine (1) the total hard cap amount and time frame over which the cap is applied, (2) whether and how to allocate the cap to sectors, (3) whether and how salmon PSC allocations can be transferred among sectors, and (4) whether and how the cap is allocated to and transferred among catcher vessel (CV) cooperatives.

If none of the options under Components 2 through 4 are selected, the Alternative 2 hard cap would apply at the fishery level and would be divided between the CDQ and non-CDQ fisheries. The CDQ Program would receive an allocation of 10.7 percent of a fishery level hard cap. The CDQ Program allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from exceeding its chum salmon cap. This prohibition would require the CDQ group to stop directed fishing for pollock once its cap was reached because further directed fishing for pollock would likely result in exceeding the cap.

The remaining 89.3 percent of a fishery level hard cap would be apportioned to the non-CDQ sectors (inshore CV sector, offshore CP sector, and mothership sector) combined. The inshore CV sector contains up to seven cooperatives, each composed of multiple fishing vessels associated with a specific inshore processor. There also is a possibility than an inshore open access sector could form, if one or more catcher vessels do not join an inshore cooperative. All PSC of non-Chinook salmon by any vessel in any of these three AFA sectors would accrue against the fishery level hard cap, and once the cap was reached, NMFS would simultaneously prohibit directed fishing for pollock by all three of these sectors.

Under Alternative 2, existing regulations related to the non-Chinook salmon PSC limit of 42,000 salmon and triggered closures of the Chum SSA in the Bering Sea would be removed from 50 CFR part 679.21.

Per Council direction (June 2010), the impact of implementing specific cap levels for Alternative 2 was analyzed based on a subset of the range of cap levels, as indicated in the tables under each component and option.

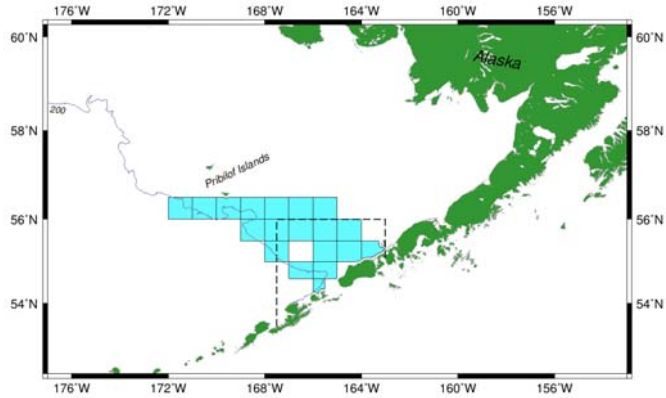
Table 4-1 Alternative 2 components, options, and sub options for analysis.

Setting the hard cap (Component 1)	Option 1a: Cap established for B season. Select cap from a range of numbers*	**Non-Chinook total**	**CDQ**	**Non-CDQ**	
		50,000	5,350	44,650	
		200,000	21,400	178,600	
		353,000	37,771	315,229	
	Option 1b: Cap established for June and July. Select cap from a range of numbers*	15,600	1,669	13,931	
		62,400	6,677	55,723	
		110,136	11,785	98,351	
Sector allocation (Component 2)*	Range of sector allocations*	CDQ	Inshore CV	Mothership	Offshore CP
	Option 2ii	6.7%	63.3%	6.5%	23.6%
	Option 4ii	3%	70%	6%	21%
	Option 6	10.7%	44.77%	8.77%	35.76%
Sector transfers and rollovers (Component 3)	No transfers (Component 3 not selected)				
	Option 1	Caps are transferable among sectors and CDQ groups within a fishing season			
		Sub option: Maximum amount of transfer limited to:		a	50%
				b	70%
				c	90%
	Option 2	NMFS rolls over unused salmon PSC to sectors still fishing in a season, based on proportion of pollock remaining to be harvested.			
Cooperative Allocation and transfers (Component 4)	No allocation	Allocation managed at the inshore CV sector level. (Component 4 not selected)			
	Allocation	Allocate cap to each cooperative based on that cooperative's proportion of pollock allocation.			
	Option: Cooperative Transfers	Option 1	Lease pollock among cooperatives in a season or a year		
		Option 2	Transfer salmon PSC (industry initiated)		
		Sub option Maximum amount of transfer limited to the following percentage of salmon remaining:		a	50%
				b	70%
				c	90%

*Table reflects subset of numbers for analysis.

4.3 Alternative 3: Triggered closure with intercooperative exemption.

Alternative 3 would create new boundaries for the Chum Salmon Savings Area. The existing Chum Salmon Savings Area and associated trigger cap would be removed from regulation. The new boundaries would encompass the area of the Bering Sea where historically 80 percent of non-Chinook prohibited species catch occurred from 2003 through 2011 B season. The trigger caps that would close this area are described in EA Chapter 2. The area closure would apply to pollock vessels that are not in an RHS system when total non-Chinook salmon PSC from all vessels (those in an RHS system and those not in an RHS system) reaches the trigger cap level. The trigger cap would be allocated between the CDQ and non-CDQ pollock fisheries, as is currently done under status quo. The non-CDQ allocation of the trigger cap would not be further allocated among the AFA sectors or inshore cooperatives, unless options to do so were selected under Components 2 through 6.



Component 1 of this alternative sets the trigger PSC cap level for this large scale closure. PSC from all vessels will accrue towards the cap level selected. However if the cap level is reached, the triggered closure would not apply to participants in the RHS program. Under Component 2, however, in addition to the large closure for non-RHS participants, a select triggered area closure would apply to RHS participants. Four options of triggered closure areas and time frames are provided under Component 2. Component 3 then sets the trigger PSC cap level for the area selected under Component 2.

Revised RHS program

Per Council request in April 2012, the RHS program under this alternative has a number of key differences from the current status quo program. Functionally the program operates largely similarly as described under Alternative 1 Section however a number of key changes have been proposed to address the Council's motion from April 2012.

The proposed program will operate on a vessel level. This means that the base rate and tier assignments are by vessels rather than by cooperative as with previous RHS program structure. Some aspects of the operation of the program have been modified to account for either suggested revisions by the Council or industry to streamline operations and/or address modification for efficiency or to better address WAK chum stocks and prioritize Chinook.

The primary revisions to the operation of the program are as follows (note that the full ICA agreement is appended to this document [TO DO when final]):

Base Rate savings closure floor: Under this provision, when the Base Rate falls below 0.10 chum salmon per metric ton of pollock there will be no closures for the week for which that Base Rate applies.

Base rate calculations and restrictions: As with the status quo RHS program, beginning June 10th the initial Base Rate for qualifying Savings Closure will be 0.19. Beginning with the second Thursday Announcement after June 10th and on each Thursday Announcement thereafter the Base Rate will be

calculated as an accumulated average. Once 3 weeks of data becomes available Sea State will recalculate the Base Rate as the 3 week rolling average of the chum bycatch rate (chum salmon per metric ton of pollock harvest) by the Fishery. Regardless of the resulting recalculated Base Rate amount, weekly adjustments of the Base Rate shall not increase by more than 20% of the previous week's Base Rate.

Modification of enforcement provisions: Some modifications of the enforcement provisions under the status quo RHS have been made. A vessel must have more than one VMS point inside a Savings Closure Area during a tow before that tow may be considered for enforcement action. Once an enforcement action has been considered, the penalty structure has been modified for these violations. The current regulations at § 679.21(g) include a requirement for the ICA to include a provision for uniform penalties of $10,000.00 per violation; all violations in a year are for the same amount. The $10,000.00 uniform penalty amount is considered "liquidated damages" and satisfies all obligations related to a violation. NMFS has identified enforcement issues with a regulatory requirement for use of minimum uniform assessements of this type (see 2.4.7.1, pg. 71), and recommends that these regulations be removed. The legal issues would not prevent the ICA from choosing to include privately enforced penalties.

Operationally in the program, there are specific measures in place in June and July when western Alaskan chum are determined to be more common on the grounds and different measures in place August through October when the Asian-origin fish are more prevalent. August to October measures are also intended to prioritize Chinook salmon over chum salmon given that catch rates for Chinook generally increase later in the B-season.

June to July measures:
More stringent closures mechanisms are in place in June and July to reflect the data indicating that western Alaskan chum are more prevalent on the fishing grounds in June and July as compared with later in the B season. All vessels are subject to any closures that are made during the month of June regardless of the vessel-specific bycatch rate. Following the first Friday after the 30th of June, qualified vessels and Mothership (MS) fleets will be assigned a Limited Test Fishing Privilege (LTFP). LTFP qualified vessels and MS fleets are allowed to fish in Savings Closure Areas during the first four days of a management week (10:00pm Friday to 10:00pm Tuesday).

In order to qualify for the LTFP vessels and MS fleets must have a rolling 2 week average bycatch rate below 75% of the current Base Rate. Vessels and MS fleets must also have landing data appearing in 2 management weeks before being considered for the LTFP. All other vessels will be prohibited from fishing in Savings Closure Areas during the month of July.

August to October measures:
Beginning with the first Thursday Announcement after July 31st, and with each Thursday Announcement for Friday Closure thereafter vessels and MS fleets will be assigned to one of three tiers based on their previous 2 weeks bycatch rate (chums per mt of pollock harvest). Tier assignments are based on the following criteria:

a. Vessels and MS fleets with a chum bycatch rate less than 75% of the Base Rate are assigned to "Tier 1".
b. Vessels and MS fleets with a chum bycatch rate equal to or greater than 75% of the Base Rate but equal to or less than 125% of the Base Rate are assigned to "Tier 2".
c. Vessels and MS fleets with chum bycatch rates in excess of 125% the Bases Rate are assigned to "Tier 3".

d. Vessels and MS fleets assigned to Tier 1 may fish in Savings Closure Areas for the Management Week (10:00 pm Friday to 10:00 pm the following Friday), vessels and MS fleets assigned to Tier 2 may fish in Savings Closure Areas for the first 4 days of the Management Week (10:00 pm Friday to 10:00 pm Tuesday), and vessels and MS fleets assigned to Tier 3 are prohibited from fishing inside Savings Closure Areas for the entire Management Week.
e. There is no minimum data requirement per vessel or MS fleet for tier assignment.

These Tier assignments are similar to those under the status quo; however they are assigned on a vessel not cooperative basis.

Further modifications to the program in August through October include a reduction in the maximum closure areas as well as provisions for ceasing all closures once a Chinook threshold rate is met.
The criteria for establishing Savings Area closures during this time period are the following:

a. Maximum area available for Savings Closures in the East Region is reduced from 3,000 sq. mi. to 1,500 sq. mi.

b. Maximum area available for Savings Closures in the West Region is reduced from 1,000 sq. mi. to 500 sq. mi.

c. Savings Closures will be made on the basis of salmon bycatch rates, with ADFG stat areas that have the highest bycatch rates being closed first. However, Sea State will evaluate the uncertainty in the bycatch rate data by area, and, among areas whose bycatch rates are not found to differ significantly, Sea State will consider pollock catch rates and first close areas with low pollock catch rates, thus preserving pollock harvesting capabilities in these areas that do not differ statistically from other areas with nominally higher bycatch rates.

d. As genetic data are received that indicates times and/or areas characterized by a higher proportion of Western Alaskan salmon, the closure selection criteria will be modified to shift the focus of closures to those areas with the highest proportion of Western Alaska salmon.

In order to explicitly prioritize Chinook over chum for management purposes, a Chinook bycatch protection threshold is designated whereby all further chum closures would cease for the remainder of the season. Under this provision, once an ADF&G Statistical Area of the Bering Sea is determined to have a Chinook bycatch of .035 Chinook per metric ton of pollock harvest, and the associated pollock harvest is determined to be at a significant level (greater than 2% of the harvest that season), chum salmon Savings Closure Areas will be suspended for the remainder of the B Season.

Alternative 3 components and option

Component 1:Fleet PSC management with non-participant triggered closure	Area	Triggered closure encompassing 80% of historical PSC. Participants in RHS would be exempt from the regulatory closure if triggered.
	Option 1: cap	Select a cap from a range of numbers: 25,000 –200,000

4.4 Alternative 4: Trigger closure with RHS exemption and options for non-exempt closures

As with Alternative 3, Alternative 4 would create new boundaries for the Chum Salmon Savings Area. The existing Chum Salmon Savings Area and associated trigger cap would be removed from regulation. The new boundaries would encompass the area of the Bering Sea where historically 80 percent of non-Chinook prohibited species catch occurred from 2003 through 2011 B season. The trigger caps that would close this area are described below. The area closure would apply to pollock vessels that are not in an RHS system when total non-Chinook salmon PSC from all vessels (those in an RHS system and those not in an RHS system) reaches the trigger cap level. The trigger cap would be allocated between the CDQ and non-CDQ pollock fisheries, as done currently under the status quo. The non-CDQ allocation of the trigger cap would not be further allocated among the AFA sectors or inshore cooperatives, unless options to do so were selected under Components 2 through 6.

Component 1 of this alternative sets the trigger PSC cap level for this large scale closure. PSC from all vessels will accrue towards the cap level selected. However if the cap level is reached, the triggered closure would not apply to participants in the RHS program. Under Component 2, however, in addition to the large closure for non-RHS participants, a select triggered area closure would apply to RHS participants. Four options of triggered closure areas and time frames are provided under Component 2. Component 3 then sets the trigger PSC cap level for the area selected under Component 2. These components and options are summarized in Table 4-2 below.

Table 4-2 Alternative 4 Components, options, and suboptions.

Component 1:Fleet PSC management with non-participant triggered closure	Area	Triggered closure encompassing 80% of historical PSC. Participants in RHS would be exempt from the regulatory closure if triggered.			
	Option 1: cap	Select a cap from a range of numbers: 25,000 –200,000			
Component 2: Trigger Closure area and timing for RHS participants	**Option 1:** Area 80%	Triggered closure encompassing 80% of historical PSC for all RHS participants			
	Suboption 1a): timing	Applies to remainder of B season if triggered			
	Suboption 1b): Timing	Applies in June and July if triggered			
	Option 2: Area 60%	Triggered closure encompassing 60% of historical PSC for all RHS participants			
	Suboption 2a): timing	Applies to remainder of B season if triggered			
	Suboption 2b): timing	Applies in June and July if triggered			
Component 3: PSC Cap levels for closure selected under Component 2 for RHS participants	**Option 1a**: PSC cap established for B season closure	Select cap from range of numbers: 25,000 – 200,000			
	Option 1b: PSC cap established for June/July proportion	Select cap from range of numbers: 7,800 – 62,400			
Component 4: Allocating the trigger cap to sectors	Range of sector allocations*:	CDQ	Inshore CV	Mothership	Offshore CP
	Option 1	10.0%	45.0%	9.0%	36.0%
	Option 2ii	6.7%	63.3%	6.5%	23.6%
	Option 4ii	10.7%	44.77%	8.77%	35.76%
	Option 6	3.4%	81.5%	4.0%	11.1%
Component 5: Sector transfers and rollovers	No transfers (Component 5 not selected)				
	Option 1	Caps are transferable among sectors and CDQ groups within a fishing season			
		<u>Suboption</u>: Maximum amount of transfer limited to:		a	50%
				b	70%
				c	90%
	Option 2	NMFS reallocates unused salmon PSC to sectors still fishing in a season, based on proportion of pollock remaining to be harvested.			
Component 6: Inshore Cooperative Allocation and transfers	No allocation	Allocation managed at the inshore CV sector level. (Component 6 not selected)			
	Allocation	Allocate cap to each inshore cooperative based on that cooperative's proportion of pollock allocation.			
	Option: Cooperative Transfers	Option 1	Lease pollock among cooperatives in a season or a year		
		Option 2	Transfer salmon PSC (industry initiated)		
		<u>Suboption</u> Maximum amount of transfer limited to the following percentage of salmon remaining:		a	50%
				b	70%
				c	90%

4.5 Comparison of Alternatives

The following section provides an overview of the four broad alternatives under consideration and the over-arching management measures that would be imposed under each. The table below compares the four alternatives, the relative time frame of the management measures being considered by alternative, or multiple options within alternatives where applicable, and the action under consideration. Both Alternatives 2 and 4 have options for a management action enacted in June and July only as compared to a similar action enacted for the entire B season. Note that the alternatives are not mutually exclusive thus measures for one alternative may be combined with those in another to form an additional alternative for consideration. For example, a June-July hard cap under Alternative 2 (Alternative 2, Component 1, Option 1b) could be combined with the B season closure to non-participants in the RHS system under Alternative 3 and 4 Component 1 to form a new management system that could be analyzed should the Council decide to mix and match amongst alternative components and options to tailor a specific program and objective for management.

Table 4-3 Comparison management measures under the four alternatives considered

Alternative	**Timing**	**Management action**		
1-Status quo	B-season	Exemption to regulatory closure of CSSA (Fig. 1) provided participation in RHS program		
2-Hard cap	B-season (Component 1, option 1a)	Fishery sectors close for the season when sector-specific cap level is reached		
	June /July (Component 1, option 1b)	Fishery sectors close until July 31 when sector-specific cap level is reached		
3-Closure area with RHS exemption	B-season (Component 1)	***Closure area applies to***	***Closure Area***	***Basis period***
		Non-participants of RHS program when **fishery level** caps reached	80% of chum (Fig. 2)	B season
4-Closure area with RHS exemption	B-season (Component 1)	***Closure area applies to***	***Closure Area***	***Basis period***
		Non-participants of RHS program when **fishery level** cap[1] reached	80% of chum (Fig. 3)	B season
	B season (Component 2, suboption 1a)	Participants of RHS program when **sector-level** cap reached	80% of chum (Fig. **Error! Bookmark not defined.**)	B season
	June/July (Component 2, suboption 1b)	Participants of RHS program when **sector-level** cap reached	80% of chum (Fig. 4)	June-July
	B season (Component 2, suboption 2a)	Participants of RHS program when **sector-level** cap reached	60% of chum (Fig. 5)	B season
	June/July (Component 2, suboption 2b)	Participants of RHS program when **sector-level** cap reached	60% of chum (Fig. 6)	June-July

[1]Note that under Alternative 4: Component 1 caps can be different than those of Component 3 in this analysis

5.0 Potential Effects of the Proposed Action on salmon

This analysis draws heavily on the analysis of the Alternatives contained in EA Chapters 4 and 5 that estimates the likely dates of pollock fisheries closures and the effect of such closures on salmon PSC. In this way, benefits are tabulated in terms of the numbers of AEQ non-Chinook salmon that would have been saved and in numbers of Chinook salmon PSC that would potentially be avoided.

Prior to embarking on a discussion of potential benefits of non-Chinook salmon savings it is important to put the potential savings into context as to their relation to run sizes. Table 5-1 below provides run size information for the regions of western Alaska used in this analysis. In total, western Alaska run size of chum salmon has had a median value of nearly 4 million fish since 1991. During this period, the average run size for western Alaska was approximately 4.5 million chum salmon. For Coastal western Alaska the run size average is analytical period in question the average run size for western Alaska was 3.7 million chum salmon and for the Upper Yukon the average is 810,507 chum salmon. The estimated southwest Alaska escapement average during this period was 1.3 million chum salmon. The key point here is that these aggregated run sizes are enumerated in, or near, millions of fish. In contrast, the aggregated (Coastal Western Alaska plus Upper Yukon) estimates of chum salmon savings by alternative appearing below exceed 100,000 fish in only one year and only under the most restrictive provisions of Alternative 2.

Further, Table 5-2 (identical to EA table 5-21) provides estimates of the impact that non-Chinook salmon PSC in the pollock fishery has on overall chum Salmon AEQ and its relative proportion of the overall run size. The analysis covers 1994 through 2009 and results indicate that the highest impact rate (chum salmon mortality due to the pollock fishery divided by run-size estimates) was less than 1.7% for the combined western Alaska stocks. In only three out of 16 years was the impact rate estimated to be higher than 0.7%, For the Upper Yukon stock, the estimate of the impact is higher with a peak rate of 2.73% estimated on the run that returned in 2006 (with upper 95% confidence bound at 3.70%;. For the SW Alaska region (taken to be from Area M) the estimate of impact rate is the lowest for any of the Alaska sub-regions.

The average impact rates for Coastal west Alaska (0.49%), Upper Yukon (1.26%), and Southwest Alaska (0.40%) are very low. According to ADF&G managers such low rates are unlikely to have had an impact on management considerations for these regions. Furthermore, the comparison of AEQ mortality due to chum salmon PSC with run sizes suggests that this relationship is correlated indicating that the PSC is likely related to magnitude of returns. For these reasons, the overall impact of the status quo on chum salmon stocks is considered to be insignificant as it is unlikely to jeopardize the sustainability of these stocks. Nonetheless alternatives are evaluated to estimate potential means to minimize the adverse impacts of the overall incidental catch levels, and regional AEQ estimates, by reducing PSC catch of chum through different management strategies under Alternatives 2, 3 and 4.

The very low impact rates identified above imply that is unlikely that in-river management would have been modified for the estimated amounts of returning AEQ chum salmon given the intricacies of in-season, in-river management. Nonetheless, the Alternatives, to the extent that they reduce salmon PSC are likely to confer a beneficial impact as the mortality of chum salmon would be reduced. None of the options would be estimated to increase the western Alaskan chum PSC in the pollock fishery although some options have a differential impact on increased proportion of Asian stocks while reducing the impact to western Alaskan stocks. Nevertheless, overall impacts of Alternatives on the chum salmon stocks are likely to be insignificant because they would not be reasonably expected to jeopardize the sustainability of chum salmon stocks. Thus, the potential benefits of the Alternatives will most likely accrue as improved stock escapement and potentially improved future productivity. Given this reality, it is simply not possible to identify numbers of returning chum salmon that may be made available to

subsistence, commercial, sport, or personal use anglers via the in-season management process. Consequently, it is simply not possible to quantify comparative levels of benefit that would accrue to users of the chum salmon resource under the action alternatives.

The analytical difficulty regarding potential benefits accruing from salmon savings should not; however, be construed as the "final word" on the potential effects of the alternatives on benefits to chum salmon users. The importance of this resource to those who are greatly dependent on it is fully documented, as discussed above, in chapter 3 of this RIR. In addition, the impacts analysis presented below contains a qualitative discussion of the potential benefits that salmon savings may provide. This is simply a case where the available quantitative methods and the underlying data, such as genetic data, do not allow as fine a resolution and quantification of effects as one would like. In such instances, it is the agency guidance that a well-informed qualitative analysis is often superior to a data poor quantitative analysis and it is with that concept in mind that this analysis largely relies upon quantitative discussion of the relative merits of reductions in chum salmon PSC in the pollock fishery, by alternative.

Table 5-1 Estimates of chum salmon run sizes by broad regions, 1991-2011. WAK includes coastal western Alaska and Upper Yukon (Fall run). These values only include regions where estimates were available and may be considered conservative. See section 5 for details and derivation on stocks from these regions. For impact rates and uncertainty, a coefficient of variation of 10% was assumed for these estimates. (Note, this table is taken from EA section 5.5.2 AEQ and Region of Origin. However, the average calculation has been added here)

	WAK run size	Coastal WAK	Upper Yukon	SW Alaska (escapement only)
1991	3,994,425	2,964,197	1,030,228	1,029,576
1992	3,284,895	2,811,796	473,099	877,674
1993	2,317,635	1,873,932	443,703	955,646
1994	4,821,985	3,882,840	939,145	1,170,604
1995	7,859,471	6,434,764	1,424,707	1,735,854
1996	5,059,317	4,010,706	1,048,611	1,433,400
1997	3,070,893	2,419,498	651,395	1,197,250
1998	3,133,865	2,811,832	322,033	2,771,735
1999	2,623,213	2,208,252	414,961	1,391,480
2000	1,379,043	1,139,744	239,299	1,110,175
2001	2,789,785	2,408,374	381,411	1,557,147
2002	3,545,500	3,121,188	424,312	1,304,489
2003	3,976,035	3,202,539	773,496	958,277
2004	3,937,242	3,324,602	612,640	1,173,828
2005	8,172,150	5,891,716	2,280,434	1,300,567
2006	8,889,338	7,738,349	1,150,989	1,380,181
2007	6,320,768	5,204,218	1,116,550	1,401,451
2008	5,283,734	4,378,634	905,100	997,037
2009	4,651,320	4,075,589	575,730	750,821
2010	4,693,153	4,086,792	606,360	
2011	5,739,776	4,533,335	1,206,441	
Median	3,994,425	3,324,602	651,395	1,197,250
Average	4,549,693	3,739,186	810,507	1,289,326

Table 5-2. Estimated median impact of the pollock fishery (based on regional AEQ estimates from Table 3-13) on chum salmon assuming run size estimates presented in Table 5-74 (with an assumed 10% CV) by broad regions, 1994-2009. WAK includes coastal western Alaska and Upper Yukon (Fall run). Italicized values are extrapolated from 2005-2009 stratum-specific mean bycatch stock composition estimates and as such have higher levels of uncertainty. They do account for the amount of bycatch that occurred within each stratum and the estimates of total run strength. Values in parentheses are the 5th and 95th percentile from the integrated combined AEQ-Genetic-run-size uncertainty model.

	Coastal WAK	Upper Yukon	WAK (coastal + Upper Yukon)	SW Alaska[1]
1994	*0.32% (0.22%, 0.45%)*	*0.61% (0.39%, 0.93%)*	*0.38% (0.27%, 0.5%)*	*0.11% (0.00%, 0.27%)*
1995	*0.07% (0.05%, 0.1%)*	*0.14% (0.08%, 0.23%)*	*0.08% (0.06%, 0.12%)*	*0.03% (0.00%, 0.07%)*
1996	*0.12% (0.09%, 0.17%)*	*0.2% (0.12%, 0.31%)*	*0.14% (0.1%, 0.19%)*	*0.04% (0.00%, 0.09%)*
1997	*0.23% (0.16%, 0.32%)*	*0.36% (0.21%, 0.57%)*	*0.26% (0.19%, 0.34%)*	*0.05% (0.00%, 0.13%)*
1998	*0.21% (0.15%, 0.3%)*	*0.81% (0.48%, 1.28%)*	*0.28% (0.2%, 0.37%)*	*0.02% (0.00%, 0.06%)*
1999	*0.2% (0.14%, 0.28%)*	*0.46% (0.27%, 0.72%)*	*0.24% (0.17%, 0.33%)*	*0.04% (0.00%, 0.08%)*
2000	*0.44% (0.31%, 0.59%)*	*1.05% (0.7%, 1.53%)*	*0.55% (0.42%, 0.71%)*	*0.04% (0.00%, 0.10%)*
2001	*0.21% (0.14%, 0.29%)*	*0.67% (0.43%, 0.96%)*	*0.27% (0.21%, 0.35%)*	*0.03% (0.00%, 0.07%)*
2002	*0.21% (0.15%, 0.29%)*	*0.7% (0.45%, 1.05%)*	*0.27% (0.2%, 0.35%)*	*0.05% (0.00%, 0.12%)*
2003	*0.42% (0.3%, 0.56%)*	*0.8% (0.52%, 1.2%)*	*0.5% (0.38%, 0.65%)*	*0.14% (0.00%, 0.34%)*
2004	*0.92% (0.66%, 1.25%)*	*2.41% (1.59%, 3.43%)*	*1.16% (0.87%, 1.51%)*	*0.25% (0.00%, 0.62%)*
2005	**1.23% (0.93%, 1.6%)**	**1.42% (0.98%, 2.04%)**	**1.28% (1.01%, 1.63%)**	**0.81% (0.39%, 1.47%)**
2006	**0.64% (0.47%, 0.86%)**	**2.63% (1.86%, 3.65%)**	**0.9% (0.7%, 1.16%)**	**0.45% (0.25%, 0.75%)**
2007	**0.31% (0.23%, 0.41%)**	**0.99% (0.71%, 1.37%)**	**0.43% (0.33%, 0.56%)**	**0.09% (0.05%, 0.17%)**
2008	**0.09% (0.07%, 0.13%)**	**0.35% (0.25%, 0.49%)**	**0.13% (0.1%, 0.18%)**	**0.02% (0.01%, 0.07%)**
2009	**0.1% (0.08%, 0.14%)**	**0.23% (0.15%, 0.35%)**	**0.12% (0.1%, 0.16%)**	**0.18% (0.10%, 0.29%)**

[1]SWAK uses escapement only as a proxy for total run size.

For the reasons outlined above, this analysis of potential economic benefits does not provided estimates of a monetary value of the salmon saved. The analysis, instead, relies on AEQ estimates of non-Chinook salmon saved as the measure of economic benefits of the alternatives and options. In addition to benefits, in terms of non-Chinook salmon saved and that may then be harvested, there are also several categories of benefits that are discussed here qualitatively due to analytical limitations identified herein. These treatments are provided for both Passive Use, and for several categories of Use and Productivity benefits. These discussions are intended to qualitatively highlight potential non-market benefits in keeping with the requirements of E.O. 12866 to consider all applicable costs and benefits of a proposed action, as discussed in the opening pages of this RIR.

5.1 Passive-use Benefits

It can be demonstrated that society places economic value on relatively unique environmental assets, whether or not those assets are ever directly exploited. For example, society places real and potentially measurable economic value on simply knowing that a rare or endangered species of animal or plant is protected in the natural environment. The term ‘value’ is used, in the present context, as it would be in a cost-benefit analysis (i.e., what would people be willing to give up to preserve or enhance the asset being assessed?). Because no market, in the traditional economic sense, exists within which protections or enhancement of environmental assets are bought, sold, or traded, there is no institutional mechanism wherein a market clearing price may be observed. Such a market clearing price would typically be used to estimate a consumer’s willingness-to-pay to obtain the goods or services being traded. Nonetheless, the continued and sustained existence of wild salmon does have economic value, as demonstrated by the current public debate over its preservation and enhancement in parts of the country where salmon stocks are identified as threatened or endangered under the ESA.

Among those holding these values, there is no expectation of directly 'using' this asset, in the normal sense of that term. Whether referred to as passive-use, non-use, or existence value, the underlying premise is that individuals derive real and measurable utility (i.e., benefit) from the knowledge that relatively unique natural assets, even if utilized sustainably, will continue to exist in perpetuity. Fundamentally, passive-use value reflects the utility an individual derives from knowing that the resource of interest (e.g., non-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." 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 on-Chinook PSC 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 non-Chinook PSC for pollock harvests in the Bering Sea. This is a requirement of Presidential Executive Order 12866.

The concept of passive-use value is well established in economic theory, supported by a growing body of empirical literature, increasingly employed in both public and private valuation analyses, and accepted by most as a legitimate, appropriate, and necessary aspect of natural resource policy and management decision-making. At present, the only widely accepted means of estimating passive-use values is by surveying people to find out what they would be willing to pay (or willing to accept, depending upon with whom the implicit property right resides) for any given action that affects a resource for which non-market values are hypothesized to exist. This approach is termed the 'contingent value' method (CVM). A substantial body of empirical literature has developed, over perhaps the last 25 years, describing the application of this technique to the valuation of natural resource assets. The use of CVM has also been carefully reviewed and accepted (when employed appropriately) by the federal courts (*Ohio v. United States Department of the Interior*, 880 F.2 432 [D.C.Cir. 1989]), as well as by NOAA (58 Federal Register 4601, 4602-14 [1993]).

Empirical research on passive-use value, within the broad context of natural resources, suggests that these economic values may be substantial when they exist. When consciously aware of risks posed to a unique asset (e.g., the Amazon rain forest), members of the public often reveal significant willingness-to-pay values for its protection. In that particular example, there is empirical evidence to support the existence of significant passive-use values (e.g., cash donations to various *Save the Amazon Rain Forest* groups or efforts, celebrity-sponsored fund raisers and large monetary donations to the cause, outright purchase of at-risk land, or acquisition of use-rights to at-risk land, etc.). Closer to home, a USDA Forest Service (Forest Service) study that used contingent valuation to measure the value the public places on the existence of critical habitat for the northern spotted owl indicated that Oregon residents were willing to pay between $49.6 million and $99 million (or $28 per acre) (Loomis et al. 1996).

In the current context, non-Chinook salmon are clearly valuable because they contribute not only to the existence and productivity of many living assets for which both market and non-market values exist (e.g., commercial salmon fisheries, Steller sea lions, sea birds, and toothed whales of various species), but also the social fabric, identity, and culture of Native and non-native peoples throughout Alaska, the Pacific Northwest, and British Columbia. While this may seem intuitively obvious, isolating a passive-use value unique to non-Chinook salmon taken in the Bering Sea nonetheless presents conceptual problems. While society's desire to sustain wild salmon stocks may be regarded as a derived demand, because it provides an ecological service that supplies an input to the production of goods and services from which society derives direct consumptive benefit, passive-use values are in addition to the value obtained from derived goods and services. It seems probable that a portion of the willingness to pay for goods and services

obtained from all the living marine resources of the Bering Sea, whether or not it is revealed in a market, has embedded in it the value of those same resources. Few holders of these values would likely be able to either explicitly recognize or express them.

That does not imply, however, that these values do not exist, or that with sufficient time and expertise, they could not be measured. It simply means that, to the best of the analysts' knowledge, there has been no study published to date concerning the passive-use value of changes in non-Chinook salmon run sizes for stocks intercepted in the Bering Sea pollock fishery. 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 PSC 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.

While the analysis offers no proof that such values exist as to non-Chinook salmon the analysis points to the significant expression of public interest and concern, especially by non-commercial fishing interests, in the matter of non-Chinook salmon PSC. While several examples can be readily cited, perhaps the most unambiguous of these is the extraordinary cultural and social value held for non-Chinook salmon, by many American Native peoples (and non-natives, alike). These non-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)

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.

5.2 Use and Productivity Benefits

As noted above, passive-use value (e.g., existence, bequest value) is often regarded as a non-use value, because it does not depend on actual or even potential interaction between the person holding the value and the resource being valued. This section addresses values associated with direct use of the resource. Among these use-benefits are several categories: market and non-market, as well as consumptive and non-consumptive uses. Each is addressed below.

Non-market/non-consumptive uses are, in general, associated with private recreation or leisure activities. A typical example of such a use is unguided catch-and-release sport fishing. Unless a guide is hired, the user does not enter into a market transaction to acquire access of the resource, nor does his or her use 'consume' the resource, except perhaps for some hooking mortality. In the current context, non-market/non-consumptive values are imbedded within the discussion of sport fishing value and represent an aspect of the aggregate benefit attributable to measures to minimize non-Chinook salmon PSC in the Bering Sea pollock fishery.

Non-market/consumptive uses may include, within the current context, authorized subsistence use, personal use, and consumptive sport use of non-Chinook salmon. Alaska Native populations, and some rural residents, have retained the right to exploit the non-Chinook salmon resources for customary and traditional cultural activities, as well as for personal use. Many western Alaska residents lead a subsistence lifestyle that is highly dependent on salmon. Others obtain salmon for winter food through personal use and consumptive sport fishing. These extra-market consumptive uses represent a benefit that would be enhanced by minimizing non-Chinook salmon PSC. They are, therefore, appropriately listed among the gains society may expect from adoption of one or more of the alternatives to the status quo.

Market/non-consumptive uses comprise activities that involve a market transaction to acquire access to the resource, but do not involve consumption of the resource. Examples may include ecotourism, wherein clients pay outfitters to guide them to locations where migrating or spawning salmon may be observed in their natural state. Consider the willingness to pay exhibited by those who incur the cost to travel to remote areas of Alaska, guided and outfitted by commercial tourism companies, simply to watch the interaction of migrating salmon and bears, eagles, and other apex predators. In the present context, guided sport fishing, when utilizing catch and release practices, would also qualify as a market/non-consumptive use. While some of this activity occurs in western Alaska, mostly in the Nushagak and Togiak areas of Bristol Bay, some consumption of fish is allowed and does occur. Thus, it is not clear what proportion of guided fishing might qualify under this criterion and what might be termed market/consumptive use. In any event, economic values of these forms will necessarily be imbedded in the overall benefit assessment of prevention of non- Chinook salmon PSC.

An additional class of market/consumptive-use values may be identified in connection with non-Chinook salmon PSC minimization measures in the Bering Sea. Improved in-river "Production and Yield" of non-Chinook salmon in the ocean environment may enhance commercial fishery opportunities (consumptive-use value) as well as improve escapements and sustainability of future non-Chinook salmon runs. The implication of these improvements could be quite important, given the numerous "source" water-sheds that contribute non-Chinook salmon lost to PSC interception in the Bering Sea pollock fisheries.

5.3 Non-Chinook (Chum) Salmon PSC and Fisheries Under Alternative 1

In October 2005, to reduce the pollock fishery's PSC of Pacific salmon, the Council adopted Amendment 84 to the BSAI groundfish FMP. Regulatory management measures implemented prior to Amendment 84 to reduce salmon PSC had not been sufficiently effective at controlling non-Chinook salmon PSC. The Council developed Amendment 84 to attempt to resolve the PSC problem through the AFA pollock cooperatives. Amendment 84 exempts pollock vessels from Chinook and Chum Salmon Savings Area closures, if the vessel participates in the RHS ICA to reduce salmon PSC. Despite these efforts, salmon PSC numbers continued to increase through the mid 2000s, and then trended downwards substantially through 2010 when 13,122 non-Chinook salmon were taken in the pollock fishery. In 2011, however, a dramatic increase in non-Chinook PSC occurred and 191,445 fish were taken (see Table ES-1, in the accompanying EA). A formal evaluation of the RHS system appears in the accompanying EA. The summary of that evaluation is reproduced here.

Collectively, the Chinook and chum salmon PSC measures implemented through the RHS system and Amendment 91 arguably represent the most extensive PSC reduction efforts that have been undertaken. In this analysis, we concentrate on the RHS components of the chum PSC reduction measures. A number of relevant findings are summarized below.

Key findings of the status quo current-period and historical analysis include:

- Chum PSC has been reduced by the chum RHS program. Looking at the change in rates following the RHS closures, the reduction is several percent, but this number is larger after controlling for vessel and closure-specific effects. The reduction in chum PSC is also larger in the June-August period than in the B-season as a whole. However, in 2011, there was not an observable average chum PSC reduction from the RHS program.
- From 2003-2011, chum PSC rates for the entire B-season in the 1-3 days following RHS closures are approximately 9 percent lower than in the 1-3 days before, after controlling for vessel- and closure-specific variation. For June-August, this average PSC reduction was 15 percent.
- Evaluating the 1993-2000 period, an RHS-like system would have reduced chum PSC by an estimated 9-22 percent on average with about 4-10% percent of pollock fishing have been relocated to other areas.

- The current period RHS analysis provides an estimate of the impact soon after the closures, but it does not account for some reduction that may occur when closures are left in place for a long period of time. However, closures are typically left in for long periods in times of relatively low chum PSC, so the majority of chum typically occurs in periods when closures are moved to address new hotspots. Further, the reduction farther away from the closures is likely to be less substantial, as the closures will usually have less impact on fishing choices as the fleet readjusts. So it is reasonable in light of these analyses, including the historical simulations, to estimate that the total chum PSC reduction to be in the range of 10-15 percent.
- Annual average share of chum PSC *caught in the* closures in the 5-days before closures were imposed from 2003-2011 ranged from 11-36 percent for CVs and from 2-32 percent for other sectors, with the majority of years being in the upper end of this range for CVs. The average percentage of pollock range caught in the closures areas during this period ranged from 7-21 percent for CVs and was 6 percent or less for the other sectors.
- The pre-RHS analysis suggest that often 'what's good for chum is good for Chinook' with the range of Chinook PSC savings as 6-14 percent per year when areas are closed because of high chum rates only.
- Based on 1993-2000 data, increasing the number of closures always reduces salmon PSC more, but at the cost of reallocating additional pollock effort per unit of PSC avoided.
- Closures based on the most recent information possible lead to larger average reductions and moderately small base rates appear on average to be more effective. At a very low PSC level, closures do not appear to be effective.
- The current "tier system" of the RHS program allows cooperatives with low PSC relative to the base rate to fish inside closed areas. This could provide some incentive for cooperatives to have lower chum PSC rates in order to be able to fish in closed areas, though these vessels often choose to fish elsewhere regardless of tier status. *During closure periods, 4.6 percent of CV pollock and 0.3 percent of pollock by the other sectors was taken inside the closure areas.* Thus there is little evidence that the incentives within the current tier system are likely to provide strong motivation for chum PSC reduction.
- An examination of the chum PSC rates in the chum Salmon Savings Area (SSA) indicates that in over 90 percent of months from 2003-2010, chum PSC rates were *lower* in the Chum SSA than outside of it, suggesting that a trigger closure of this area could be actually increase chum PSC.
- An evaluation of the B-season Chinook Conservation Area (BCCA) which is imposed by the CP/MS/CDQ incentive plan agreement (IPA) suggests that there is little evidence to suggest the BCCA is likely to have a significant impact on chum PSC rates.
- In 2011, chum RHS closures were in place throughout the B season, whereas in previous years Chinook closures were explicitly given regulatory priority. Additionally, in 2011 all vessels had 100 percent coverage and salmon was censused in the plant. This did not lead to greater chum reduction.
- As well as changing Chinook-avoidance incentives, Amendment 91 also changes the incentive to avoid Chinook *relative* to chum – vessels do not pay an individual cost of chum, but do for Chinook – therefore vessels will be likely to choose to fish in high chum grounds with zero Chinook over low chum grounds with any Chinook in them.

Compared to alternative spatial management systems, the RHS system has advantages and limitations. Key advantages of the hotspot system relative to fixed closures include:

- Sea State has shown the ability to make trade-offs between chum and Chinook PSC and to consider how vessels will respond.

- Adjustments to what areas will be closed can be made regularly in response to the substantial inter-annual variability in the quantity and concentration of PSC. This prevents the possibility that fixed closures would consistently force vessels from low-PSC areas, which is a possibility with any system that cannot adjust.
- Anecdotal information from vessel operators and plant managers can be combined with observer data, VMS data, and knowledge of how seasonal PSC conditions evolve to make well-informed predictions of where salmon PSC will occur in the near-term. For example, from the 8/27/07 SeaState report – "It would be particularly useful to know if there is a temperature front associated with higher or lower PSC, as there was further up on the shelf."
- In balancing the chum and Chinook PSC, the RHS system has demonstrated the ability to carefully balance the trade-offs in a manner that could not be done with fixed closures.

5.4 Effects of Alternative 2 on Chum Salmon

The information presented here is taken directly from the analysis, contained in EA Chapter 5, of hypothetical reductions in non-Chinook salmon PSC and a relatively comparison of those salmon "saved" with region specific AEQ non-Chinook salmon estimates. For a complete description of the methodology please see Chapter 3 of the accompanying EA.

The benefits, in numbers of aggregate Coastal Western Alaska non-Chinook Adult Equivalent (AEQ) salmon that would potentially have accrued under Alternative 2, Option 1a, are dependent on the level of PSC and on the level of the hard cap. The greatest benefits under Alternative 2, option 1a, in numbers of adult non-Chinook salmon saved, would occur in the highest PSC years (2005 and 2006) and under the most restrictive hard cap of 50.000 fish with the greatest benefit coming from the CV sector.

Under allocation scenario 1, total non-Chinook salmon saved, as shown in Table 5-3, in the CV sector under the 50,000 cap are estimated to range from zero, in recent years of low PSC, to as high as 59,982 fish in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 6,045 (2005) under the 50,000 cap. The mothership sector estimates ranged from zero to 1,369, while the CDQ sector estimates ranged from zero to 541. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly lowering these numbers in all other sectors and sector allocation scenario 3 further increases CV non-Chinook salmon saved while reducing the estimates in the other sectors.

As the hard cap level is increased to 200,000, and then to 353,000 fish, the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some cases only, from the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

Table 5-3 Estimated Aggregate Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	512	5,280	954	19,107	117	3,672	419	9,349		2,652		2,483
2005	541	6,045	1,369	59,982	111	4,217	535	40,072		2,730	27	19,705
2006	178	2,340	549	42,415	25	1,208	199	23,569		700	15	10,057
2007	186	1,185	190	8,450				2,417				
2008	102	497	104	314								
2009												
2010												
2011	252	2,238	1,450	3,945		1,097	1,004			142	594	
Total	1,772	17,585	4,617	134,213	254	10,194	2,156	75,408		6,224	636	32,245

4ii (sector allocation 2)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	372	4,619	823	19,859		2,652	40	11,942		103		6,017
2005	402	5,208	1,182	61,468		2,304	109	46,190		56		30,143
2006	129	1,721	475	43,800		466	48	29,131				16,893
2007	103	657	124	9,337				3,987				1,192
2008	57	298	68	585								
2009				546								
2010				299								
2011	162	1,766	1,356	4,549			657				111	
Total	1,226	14,268	4,028	140,443		5,421	854	91,250		159	111	54,246

6 (sector allocation 3)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	202	3,999	727	20,606		749		14,916				9,640
2005	231	4,665	965	63,184		411		52,662				41,244
2006	69	1,355	375	45,495				35,191				24,440
2007		233	60	10,317				5,668				2,590
2008		128	33	853								
2009				1,318								
2010				723								
2011	87	1,308	1,277	5,251			419	845				
Total	589	11,688	3,436	147,748		1,159	419	109,281				77,914

The impact of Alternative 2, option 1b, is shown in Table 5-4 below. In comparison to option 1a, the change in timing of option 1b results in considerably fewer, by more than half, salmon saved than under option 1a. It is also apparent that there are some reductions in salmon savings in the non-CV sectors in some years. What is perhaps most striking, in contrast to Option 1a, is that the salmon savings, largely accruing in the CV sector, does not change nearly as much when the cap level is increased. Also shown is that moving from allocation scenario one to two, and then to six does not change the salmon savings numbers very much. This is also in contrast to Option 1a. In a few instances, the estimates are negative, which indicates that the closure may result in more non-Chinook salmon taken than under the status quo condition.

Table 5-4 Estimated Aggregate Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1b for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-1,654	-93	-184		-1,707	11			-1,676		
2005		-1,926	166	28,543		-1,734	5	26,376		-919	-202	23,907
2006		-296	110	25,393		-434	0	21,483			-111	17,331
2007		5	-4	5,326		2		3,850				2,315
2008		-87	-2									
2009			-83	223								
2010			-44	123								
2011	-237	324	138	616		215	29	-194		314	2	
Total	-237	-3,634	190	60,040		-3,657	45	51,515		-2,280	-311	43,553

4ii (sector allocation 2)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-1,582	-94	-1,357		-1,596				-507		
2005		-2,089	143	27,964		-875	-173	27,284		-278		24,687
2006		-461	99	25,643			-95	22,655				19,276
2007		114	7	5,463				4,219				3,147
2008			4									
2009			-47	74								
2010			-26	41								
2011	-81	266	106	742		139	5	-25			-147	
Total	-81	-3,752	192	58,568		-2,332	-263	54,133		-785	-147	47,110

6 (sector allocation 3)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-1,678	-82	-3,119		-409						
2005		-2,378	81	27,025		-224	-201	28,392				26,443
2006		-700	64	25,723			-110	24,099				21,546
2007		55		5,502				4,678				3,864
2008				-19								
2009				-111								
2010				-61								
2011		257	105	903			-46	213			-109	-84
Total		-4,444	169	55,842		-633	-357	57,383			-109	51,768

The benefits, in numbers of aggregate Upper Yukon non-Chinook Adult Equivalent (AEQ) salmon that would potentially have accrued under Alternative 2, Option 1a, are dependent on the level of PSC and on the level of the hard cap. As with the Aggregate of Western Alaska non-Chinook, the greatest benefits under Alternative 2, option 1a, in numbers of Upper Yukon adult non-Chinook salmon saved, would occur in the highest PSC years (2005 and 2006) and under the most restrictive hard cap of 50.000 fish with the greatest benefit coming from the CV sector.

Table 5-5 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	225	3,209	460	8,394	52	1,961	184	4,108		1,165		1,091
2005	211	2,940	641	28,685	45	1,861	205	18,236		1,094	10	7,545
2006	63	1,089	251	25,247	9	431	71	12,112		249	5	3,809
2007	83	618	84	6,639				1,836				
2008	45	220	46	139								
2009												
2010												
2011	111	1,383	940	2,325		482	551			62	261	
Total	738	9,460	2,422	71,430	106	4,735	1,011	36,291		2,571	276	12,444

4ii (sector allocation 2)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	163	2,715	362	8,725		1,165	18	5,246		45		2,644
2005	157	2,435	523	29,467		942	41	21,441		25		13,023
2006	46	696	210	26,207		166	17	15,961				7,997
2007	46	327	55	7,185				3,140				905
2008	25	132	30	259								
2009				122								
2010				67								
2011	71	972	857	2,850			289				49	
Total	509	7,277	2,038	74,883		2,273	364	45,789		70	49	24,570

6 (sector allocation 3)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	89	2,245	319	9,053		329		6,553				4,235
2005	91	2,112	408	30,374		180		24,858				18,858
2006	24	483	156	27,389				20,147				12,670
2007		103	27	7,811				4,542				1,976
2008		57	15	378								
2009				295								
2010				162								
2011	38	575	789	3,461			184	371				
Total	243	5,576	1,712	78,923		509	184	56,471				37,738

Under allocation scenario 1, total Upper Yukon non-Chinook salmon saved, as shown in Table 5-5, in the CV sector under the 50,000 cap are estimated to range from zero, in recent years of low PSC, to as high as 28,685 fish in 2005. The CP sector is estimated to have Upper Yukon non-Chinook salmon saved of between zero and 3,209 (2004) under the 50,000 cap. The mothership sector estimates ranged from zero to 641, while the CDQ sector estimates ranged from zero to 541. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly lowering these numbers in all other sectors and sector allocation scenario 3 further increases CV non-Chinook salmon saved while reducing the estimates in the other sectors.

As the hard cap level is increased to 200,000, and then to 353,000 fish, the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some cases only, from the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

The impact of Alternative 2, option 1b, on Upper Yukon non-Chinook Adult Equivalent (AEQ) salmon saved is shown in Table 5-6 below. In comparison to option 1a, the change in timing of option 1b results in considerably fewer, by as much as a third, salmon saved than under option 1a. It is also apparent that there are some reductions in salmon savings in the non-CV sectors in some years. What is perhaps most striking, in contrast to Option 1a, is that the salmon savings, largely accruing in the CV sector, does not change nearly as much when the cap level is increased. Also shown is that moving from allocation scenario one to two, and then to six does not change the salmon savings numbers very much. This is also in contrast to Option 1a. In a few instances, the estimates are negative, which indicates that the closure may result in more non-Chinook salmon taken than under the status quo condition.

Table 5-6 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1b for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:		**15,600**				**62,400**				**110,136**		
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		295	68	20		93	30			-65		
2005		-26	239	17,463		-196	103	15,725		-36	-32	13,999
2006		144	114	17,856		-132	48	14,624			-17	11,315
2007		133	59	4,540		2		3,291				1,995
2008		-5	32									
2009			-14	122								
2010			-2	67								
2011	-73	665	414	1,759		449	301	162		321	229	
Total	-73	1,207	909	41,828		216	481	33,802		220	179	27,309

4ii (sector allocation 2)

Cap:		**15,600**				**62,400**				**110,136**		
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		258	49	-356		-111				5		
2005		-170	219	17,329		-61	-13	16,347		3		14,650
2006		8	107	18,105			-7	15,548				12,948
2007		98	38	4,655				3,611				2,695
2008			21									
2009			-9	109								
2010			-5	60								
2011	-25	576	381	1,891		166	238	589			71	
Total	-25	771	801	41,792		-6	217	36,095		7	71	30,293

6 (sector allocation 3)

Cap:		**15,600**				**62,400**				**110,136**		
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		152	37	-984		168						
2005		-366	176	17,047		92	-58	17,010				15,781
2006		-161	86	18,242			-32	16,617				14,686
2007		47		4,839				3,997				3,308
2008				65								
2009				89								
2010				49								
2011		513	380	2,061			169	1,074			6	270
Total		185	680	41,407		261	79	38,698			6	34,046

5.5 Potential Effects of Alternative 3 on Chum Salmon

Section 5.5.3 of the Accompanying EA contains results of an extensive analysis of the potential impacts of the revised RHS system, Under Alternative 3, on chum salmon. This analysis utilizes the simulation analyses that were used to evaluate the efficacy of the RHS under the Status Quo. Given that the extensive analysis is presented in the EA along with and appendix containing the full industry proposal for revising the RHS, this section will only repeat the summary of that analysis. The reader is directed to the EA for greater clarity and detail.

Table 5-7 Summary of Alternative 3 RHS modifications and impacts

Program Feature	2011 Status quo	Alternative 3, proposed revision	Discussion of Impact
Initial base rate	0.19	0.19	
Adjusted base rate (3-week moving average)		Minimum rate of 0.10 required for closures.	Little impact on chum; possible improvement in pollock fishing.
Max area	Max of 3,000 sq. mi. East of 168, 1,000 sq. mi. West of 168	Max of 3,000 sq. mi. East of 168, 1,000 sq. mi. West of 168	No change
Number of areas	Max 2 East of 168, 1 west of 168	No maximum	Ability to implement more small closures, though this is optional
Level of Tier status	Vessel/MS platform level	Cooperative-level	Potential for improvement in chum PSC reduction, though magnitude uncertain & unlikely to be large with same sized closures as status quo
Tier system	No closures for Tier 1 coops <0.75 of base rate; 4-day closures for Tier 2 coops with 75-125% of base rate; 7-day closures for Tier 3, >125% of base rate	June: no tier system, closures for all; July: <75% can stay in closure for 4-days, then leave; other vessels 7-day closures; August until end or Chinook suspension: same tiers as status quo, but Tier 2 vessels can fish for 4-days and then must leave instead of being excluded for 4 days	On average, minimal impact expected from these changes, although at times there could be stronger or weaker incentives to avoid areas. Less than 6 % of fishing during the 5-days after closures occurred in areas. For example, in June there is no tier system so therefore no link to individual or coop behavior. The change in Tier 2 status will allow more fishing in the closures in August and beyond.
Chum closures suspended after Chinook exceeds threshold		Chum closures removed in late August or September	Increased flexibility late in the season that could slightly increase chum bycatch, reduce Chinook, and better achieve TAC.
New Flexibility added		Potential focus on areas with more AK chum; flexibility to leave better pollock areas open when catch rates are similar	More likely and less costly to achieve TAC; potential slight reduction in Chinook because faster pollock fishing means less pollock caught in high Chinook bycatch period in October

5.6 Effects of Alternative 4 Triggered Closures on Chum Salmon

The potential effects on Western Alaska non-Chinook salmon of the Alternative 4 triggered area closure under Option 1a are presented in Table 5-8, while the potential effects under Option 1b are presented in Table 5-9. As with Alternative 2, the benefits, in numbers of Aggregate Coastal Western Alaska non-Chinook salmon that would potentially have accrued under Alternative 4, Option 1a, are dependent on the level of PSC and on the level of the hard cap. The greatest benefits in numbers of Aggregate Coastal Western Alaska non-Chinook salmon saved under Alternative 4 would occur in the highest PSC years (2005 and 2006) and under the most restrictive hard cap of 25,000 fish with the greatest benefit coming from the CV sector.

Under allocation scenario 1, the 2005 total non-Chinook salmon savings in the CV sector under the 25,000 cap are estimated to range from a negative value to as high as 41,065 fish. The CP sector is estimated to have non-Chinook salmon saved of between zero and 2,204 (2004) under the 25,000 cap. The mothership sector estimates ranged from negative to 719 (2011), while the CDQ sector estimates ranged from negative to 209 non-Chinook salmon saved. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector in most years while slightly lowering these numbers in most years in all other sectors. Under sector allocation scenario 3 there are additional small increases in CV non-Chinook salmon saved while reducing the estimates in the other sectors.

As the hard cap levels is increased to 25,000, 75,000, and 200,000 fish the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. For example, the 2005 CV sector savings estimates decrease from 41,065, to 35,102, and then to 21,060 as the cap is increased. It is also apparent that the savings accrue mostly from the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

In comparison to option 1a, the change in timing of option 1b results in considerably fewer, by not quite half, Western Alaska non-Chinook salmon saved than under option 1a. It is also apparent that there are some reductions in non-Chinook salmon savings in the non-CV sectors in some years. Similar to the pattern shown above under Alternative 2, in contrast to Option 1a the salmon savings, largely accruing in the CV sector, does not change nearly as much when the cap level is increased. Also shown is that moving from allocation scenario one to two, and then to six does not change the salmon savings numbers very much. This is also in contrast to Option 1a.

Table 5-8 Estimated Aggregate Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	41	2,204	274	8,803	20	2,149	315	7,957	-7	2,098	188	6,579
2005	-9	1,546	551	41,065	-20	1,203	388	35,102	-4	1,201	80	21,060
2006	0	533	276	33,240	0	113	164	27,475		28		13,088
2007	-9	173	4	6,867	-3	31	2	5,843				1,930
2008	-5	3	1	-289	-2	-5	1					
2009	2		0	808								
2010	1		0	443								
2011	209	733	719	1,988	164	723	592	535		726	392	
Total	229	5,192	1,822	92,927	159	4,214	1,462	76,911	-11	4,054	661	42,657

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	25	2,132	308	8,941	-4	2,084	245	7,395		1,778		8,706
2005	-20	1,244	487	40,732	0	1,192	142	37,761		978		25,228
2006	0	279	221	33,421	0	27	35	29,759		2		17,128
2007	-6	114	1	7,121	0	-43		6,171				3,219
2008	-3	-1	1	-265	0	-24		-53				
2009			0	1,124								
2010			0	616								
2011	197	732	680	2,417	74	727	544	1,150			278	
Total	192	4,499	1,697	94,109	69	3,963	966	82,183		2,757	278	54,281

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	22	2,157	297	8,881	3	1,988	223	8,077		248		8,466
2005	-17	1,198	404	40,228	1	1,145	81	39,541		136		29,985
2006	0	100	179	33,483		30		31,512				22,429
2007	-3	25	1	7,650				6,230				4,717
2008	-2	-6	1	-108				-319				
2009				1,378				83				
2010				767				45				
2011	146	719	653	2,608		493	431	1,342			21	176
Total	146	4,192	1,536	94,888	4	3,657	734	86,512		384	21	65,773

Table 5-9 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-7	-285	-65	-2,347		-296	-75			-338	8	
2005	-4	107	386	26,653		71	326	28,556		-158	203	25,678
2006		309	232	25,160		266	204	24,632		25	109	20,800
2007		97	-1	5,434		76		4,921		6		3,685
2008		3	0	9								
2009	0	0	11	874				241				
2010	0	0	20	479				132				
2011	13	17	322	1,614	-3	22	277	930		21	193	48
Total	1	247	904	57,876	-3	139	732	59,412		-444	513	50,210

4ii (sector allocation 2)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-283	-63	-3,736		-340	-77	-39		-323		
2005		79	363	25,882		-154	254	28,246		-177	82	26,810
2006		266	220	25,184		92	162	24,788			45	22,113
2007		73	-1	5,444		41		5,100				4,065
2008		-1	0	-6								
2009			14	900				501				
2010			8	556				275				
2011	8	22	315	1,782		21	239	1,271		0	168	549
Total	8	155	855	56,005		-340	578	60,141		-499	295	53,536

6 (sector allocation 3)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-305	-74	-4,688		-338	-19	-743		65		
2005		67	349	24,468		-187	234	27,699		36		27,909
2006		266	215	24,712		-1	134	25,074				23,558
2007		76	-1	5,488				5,311				4,526
2008			0	-6								
2009			6	834				745				
2010			3	588				408				
2011	-3	22	301	1,896		19	214	1,475			114	721
Total	-3	125	800	53,294		-506	564	59,969		101	114	56,714

In addition to the potential effects of Alternative 4 on Aggregate Western Alaska non-Chinook salmon the potential effects on Upper Yukon river non-Chinook have also been estimated and are presented in table Table 5-10 and Table 5-11 for options 1a and 1b, respectively. Under allocation scenario 1, total non-Chinook salmon savings in the CV sector under the 25,000 cap are estimated to range from a negative value to as high as 20,874 fish. The CP sector is estimated to have non-Chinook salmon saved of between zero and 1,017 (2004) under the 25,000 cap. The mothership sector estimates ranged from zero to 280 (2005), while the CDQ sector estimates ranged from negative to 92 non-Chinook salmon saved. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly increasing the estimates in all sectors and in most years. Under sector allocation scenario 3 there are

additional small increases in CV non-Chinook salmon saved while reducing the estimates in the other sectors.

As the hard cap levels is increased to 25,000, 75,000, and 200,000 fish the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. For example, the 2005 CV sector savings estimates decrease from 20,265, to 17,082, and then to 9,525 as the cap is increased. It is also apparent that the savings accrue mostly from the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

Table 5-10 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	18	1,017	102	3,868	9	994	139	3,496	-3	984	83	2,891
2005	-4	736	280	20,265	-9	550	202	17,082	-2	558	35	9,525
2006	0	363	151	20,874	0	70	89	16,916		10		7,026
2007	-4	137	2	5,784	-2	27	1	4,724				1,465
2008	-2	1	0	-128	-1	-2	0					
2009	0		0	196								
2010	0		0	107								
2011	92	324	464	1,417	72	316	353	235		319	180	
Total	100	2,579	999	52,383	70	1,954	785	42,454	-5	1,871	298	20,906

4ii (sector allocation 2)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	11	975	132	3,928	-2	972	108	3,249		781		3,825
2005	-9	568	254	20,080	0	551	69	18,540		429		11,679
2006	0	197	120	21,083	0	10	19	18,384		1		9,899
2007	-3	91	1	5,979	0	-19		5,036				2,537
2008	-2	0	0	-117	0	-11		-23				
2009			0	301								
2010			0	165								
2011	87	323	430	1,790	32	319	312	688			122	
Total	85	2,153	937	53,208	30	1,822	508	45,873		1,211	122	27,940

6 (sector allocation 3)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	10	996	123	3,866	1	889	98	3,549		109		3,719
2005	-8	548	207	19,789	1	507	36	19,468		60		14,261
2006	0	61	97	21,209		11		19,625				13,575
2007	-2	22	1	6,282				5,274				3,786
2008	-1	-2	0	-56				-141				
2009				378				19				
2010				215				10				
2011	64	312	407	1,956		217	213	855			9	77
Total	64	1,937	836	53,639	2	1,623	347	48,658		169	9	35,419

In comparison to option 1a, the change in timing of option 1b results in fewer Yukon River non-Chinook salmon saved than under option 1a. It is also apparent that there are some reductions in non-Chinook salmon savings in the non-CV sectors in some years. Similar to the pattern shown above under Alternative 2, in contrast to Option 1a the salmon savings, largely accruing in the CV sector, does not change nearly as much when the cap level is increased. Also shown is that moving from allocation

scenario one to two, and then to six does not change the salmon savings numbers very much. This is also in contrast to Option 1a.

Table 5-11 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	2	113	46	-776		59	16			2	20	
2005	1	213	263	16,373		169	222	16,759		19	129	14,977
2006		222	138	17,573		190	121	16,773		18	65	13,890
2007		98	2	4,671		63		4,158		5		3,113
2008		12	1	51								
2009	0	0	5	303				81				
2010	0	0	16	166				44				
2011	14	32	375	2,006	-1	29	333	1,286		29	245	181
Total	17	689	845	40,367	-1	511	692	39,101		72	459	32,162

4ii (sector allocation 2)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		88	42	-1,321		1	1	-12		-56		
2005		184	250	16,104		24	175	16,747		-31	50	15,659
2006		190	131	17,637		75	96	17,039			27	14,858
2007		63	2	4,735		34		4,308				3,439
2008		0	1	69								
2009			5	317				168				
2010			3	237				92				
2011	9	29	368	2,160		29	296	1,595		2	182	704
Total	9	554	801	39,938		162	567	39,936		-85	260	34,660

6 (sector allocation 3)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		50	28	-1,688		2	17	-222		63		
2005		164	238	15,613		1	155	16,663		35		16,314
2006		190	128	17,529		0	80	17,387				15,925
2007		63	2	4,898				4,485				3,827
2008			1	157								
2009			2	324				253				
2010			1	304				139				
2011	-1	29	355	2,276		26	268	1,819			116	924
Total	-1	497	755	39,413		29	519	40,524		98	116	36,991

Results of the Western Alaska non-Chinook salmon saved estimates under Alternative 4, Options 2a and 2b, are presented in Table 5-12 and Table 5-13 below. These options result in fewer chum salmon being saved. Under option 2a the largest salmon savings would have occurred in 2005 within the CV sector when 28,360 non-Chinook salmon would have been saved. Under Option 2b, this number falls to 21,788. The patterns of changes in salmon savings as the cap is increased and the allocation is changed generally mimic the patterns discussed above.

Table 5-12 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-39	945	189	-2,306	-58	899	233	266	-9	896	136	962
2005	-15	740	454	28,360	-26	464	306	24,481	-5	489	80	11,428
2006	0	391	222	24,895	0	70	121	20,637		-1		8,462
2007	-8	95	2	4,677	-3	-14	2	4,024				1,363
2008	-5	-19	1	-141	-2	-27	1					
2009	2		0	779								
2010	1		0	427								
2011	180	351	340	-58	145	343	284	-1,385		331	136	
Total	115	2,502	1,207	56,633	57	1,735	946	48,023	-14	1,715	352	22,215

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-57	877	195	-2,281	-13	853	144	-1,358		901		2,760
2005	-26	499	379	28,428	-6	466	138	26,762		495		15,456
2006	0	215	174	25,167	0	-1	32	22,696		0		11,786
2007	-6	59	1	4,841		-25		4,284				2,262
2008	-3	-23	1	-121		-14		-29				
2009			0	1,040								
2010			0	570								
2011	168	350	303	195	78	336	241	-943			84	
Total	77	1,977	1,054	57,839	59	1,615	554	51,413		1,396	84	32,265

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-53	903	222	-2,442	3	896	142	-1,994		93		407
2005	-23	461	319	27,692	1	490	81	27,296		51		19,977
2006	0	58	133	25,090		-1		23,682				16,262
2007	-3	-20	1	5,219				4,412				2,980
2008	-2	-27	1	-34				-129				
2009				1,259				84				
2010				701				46				
2011	149	339	293	385		310	175	-728			-141	-580
Total	69	1,714	969	57,871	4	1,695	398	52,669		144	-141	39,047

Table 5-13 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-10	-89	-34	-2,154		-89	-31			-89	8	
2005	-5	-17	244	21,788		-17	192	23,555		-17	74	21,187
2006		65	144	20,285		65	115	19,815		17	38	16,660
2007		26		4,234		26		3,783				2,765
2008				-2								
2009			17	712				240				
2010			24	390				132				
2011	16		202	1,166			157	762			123	103
Total	1	-14	596	46,418		-14	433	48,287		-89	243	40,714

4ii (sector allocation 2)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-89	-33	-3,555		-89	-31	-39		-106		
2005		-17	222	21,043		-17	117	23,289		-58	70	21,821
2006		65	131	20,326		17	74	19,929			38	17,615
2007		26		4,266				3,926				3,098
2008				-4								
2009			16	740				455				
2010			9	436				250				
2011	11		195	1,317			119	808			121	506
Total	11	-14	540	44,568		-89	278	48,619		-165	229	43,040

6 (sector allocation 3)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-89	-32	-4,115		-89	-10	-738				
2005		-17	213	19,933		-49	83	22,734				22,845
2006		65	127	19,903			49	20,211				18,705
2007		26		4,335				4,138				3,388
2008				16								
2009			6	711				592				
2010			4	420				324				
2011			181	1,395			119	1,058			102	660
Total		-14	499	42,598		-138	241	48,318			102	45,599

Table 5-14 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-17	393	62	-1,013	-25	367	103	117	-4	396	60	423
2005	-7	340	226	14,998	-11	188	158	12,796	-2	216	35	5,660
2006	0	272	121	15,688	0	51	66	12,889		0		4,863
2007	-4	88	1	3,895	-1	5	1	3,250				1,035
2008	-2	-9	0	-63	-1	-12	0					
2009	0		0	190								
2010	0		0	104								
2011	79	160	245	473	64	153	196	-609		146	67	
Total	50	1,245	656	34,272	25	752	523	28,444	-6	757	162	11,981

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-25	349	68	-1,002	-6	358	63	-596		396		1,213
2005	-11	204	190	15,036	-2	196	67	14,084		217		7,752
2006	0	161	95	15,903	0	0	17	14,175		0		7,141
2007	-3	61	1	4,018		-11		3,487				1,781
2008	-1	-10	0	-54		-6		-13				
2009			0	276								
2010			0	151								
2011	74	160	213	693	34	148	159	-296			37	
Total	34	924	566	35,021	26	684	306	30,841		613	37	17,887

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-23	368	91	-1,109	1	396	62	-876		41		179
2005	-10	186	162	14,624	1	217	36	14,399		22		10,345
2006	0	42	72	15,942		0		14,875				9,957
2007	-1	0	1	4,245				3,665				2,380
2008	-1	-12	0	-23				-57				
2009				342				19				
2010				195				10				
2011	65	150	204	858		136	101	-109			-62	-255
Total	30	735	531	35,074	2	748	199	31,926		63	-62	22,606

Table 5-15 Estimated Upper Yukon non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-1	-18	27	-708		-18	17			-18	20	
2005	0	8	159	13,148		8	129	13,496		7	53	12,058
2006		50	85	13,957		50	69	13,223		9	23	10,863
2007		22		3,576		22		3,193				2,331
2008				0								
2009			6	245				81				
2010			17	134				44				
2011	15		238	1,386			195	936			158	113
Total	14	62	531	31,739		62	410	30,973		-1	253	25,365

4ii (sector allocation 2)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-18	23	-1,297		-18	10	-12		-37		
2005		8	146	12,869		7	83	13,489		-21	42	12,425
2006		50	78	14,027		9	43	13,437			23	11,586
2007		22		3,623				3,312				2,617
2008				9								
2009			6	260				153				
2010			3	169				84				
2011	10		230	1,521			158	983			128	498
Total	10	62	486	31,181		-1	295	31,446		-58	193	27,127

6 (sector allocation 3)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-18	20	-1,516		-18	16	-220				
2005		8	141	12,485		-10	62	13,399				13,034
2006		50	75	13,934			29	13,783				12,366
2007		22		3,766				3,490				2,862
2008				85								
2009			2	271				199				
2010			1	172				109				
2011			218	1,600			157	1,227			98	698
Total		62	458	30,796		-27	264	31,987			98	28,960

5.7 Qualitative Discussion of the Potential Benefits of Non-Chinook Salmon Savings.

The non-Chinook salmon savings number presented above provide a limited indication of how the western Alaska region may benefit in terms of numbers of adult fish that may return to natal streams. Perhaps the primary benefit of these returns is the potential for enhanced escapement leading to future benefits of improved run strength. Improved run strength in the future can be expected to provide benefits to subsistence and commercial users of the salmon resource. Just as the estimates of salmon saved presented above are relatively small with respect to overall run size, in some instances the returns of chum salmon to a particular river system in western Alaska are also relatively small with respect to the aggregated overall run size. Given that the ability of the analysis to differentiate between river systems is highly limited by the available genetic data it is not possible to identify whether an estimated benefit, in terms of salmon saved, will be of substantially greater importance to one stream versus another. It is possible that even a few thousand returning fish may be critically important to one specific river system. Even the relatively small numbers of estimated adult returning salmon predicted herein may be of a level of importance to a specific area that is in excess of what the analysis is capable of identifying. Thus, there are inherent benefits to the health of the salmon resources of western Alaska from even small numbers of returning salmon.

Clearly, improved run strength may lead to greater harvest thereby improving current conditions for harvesters. It is important to recognize that cash income is often earned in the commercial harvesting portion of the salmon fishery and used to support subsistence activities. In some cases, especially with the high cost of fuel, subsistence activities may be reduced if commercial harvesting income is lacking. Even a few hundred fish that are made available to commercial harvesters in-river due to “salmon savings” under the alternatives in question may provide a family or multiple families with just enough cash income to afford more time at fish camp to meet their subsistence needs for the coming winter. Though it is not possible to quantify exactly what effect the salmon savings estimated under the alternatives would have on commercial harvesters in any particular river system it is important to recognize that even a few hundred fish, and a few hundred dollars from those fish, may be critically important in many villages throughout western Alaska.

A significant problem for subsistence users is restrictions in the amount of time they may fish and in the gear (mesh size) they are allowed to use. To the extent that salmon savings leads to improved run strength it is likely that such improvements would tent to lead to fewer subsistence restrictions. Longer subsistence fishing periods may reduce the cost of subsistence activities simply by reducing long river boat trips, which burn large amounts of fuel. If a subsistence user is allowed twice as long to fish in a given time period they are more likely to meet their subsistence needs sooner and minimize the costs of traveling to and from fish camp. Another potential benefit of reductions in subsistence restrictions is the potential to meet subsistence needs more quickly which allows for additional harvest to be shared within the family and community. Such sharing is extremely important within the native culture of western Alaska. Sharing is also important in limiting the risk of food shortages that require purchase of store bought food that is arguably not as healthy and is substantially more expensive than subsistence foods.

Along with improved runs, and potentially reduced restrictions on harvests, comes the potential to improve usage and quality of chum salmon by limiting fishing to times when the weather is optimal for drying fish. Subsistence users do experience spoilage of fish if the weather is too wet, but they are forced to fish a subsistence opening because they may not have another opportunity in the coming weeks if the run does not come in as forecast. If the run strength is improved and restrictions are relaxed then

subsistence users can delay harvest during bad weather and still have ample opportunity to meet subsistence needs, without spoilage, during periods of better weather.

An additional benefit of improved run strength and reduced restrictions on harvesting activities is that harvesting activities can be done more quickly, which can allow participation in wage income earning activities. Often, commercial openings and subsistence openings occur at differing times and, with the increased investments in processing facilities being made by western Alaska CDQ entities, there may be wage earning jobs available in fish processing or in other activities in town.

All of the potential benefits discussed here are fundamentally important to the cultural wellbeing of western Alaska residents, and the sustainability of their families and communities. The numerical analysis of salmon savings presented above is admittedly limited in its ability to address the issues highlighted here and a quite extensive background treatment on the importance of the salmon resources to western Alaska residents has been especially prepared for this analysis and is contained in Chapter 3. One must gauge the potential benefits of the proposed action, though difficult to quantify, with respect to the status quo conditions detailed in Chapter 3. One must also bear in mind that when a resource, such as chum salmon, constitutes a critically needed subsistence food supply even small numbers of returning adult salmon may be critically important in specific areas of western Alaska.

5.8 Potential Effects of Alternative 1 on Chinook Salmon.

The current Chinook bycatch management program was evaluated in the FEIS (NPFMC/NMFS 2009) and was found to not adversely impact Chinook salmon stocks. Thus results for status quo are considered to be insignificant. Alternatives are evaluated against the status quo incidental catch to estimate potential means to minimize the impacts of chum PSC and in doing so these alternatives may either minimize the impacts on Chinook PSC or increase the impacts on Chinook by increasing the incidental catch above that realized under status quo.

5.9 Effects of Alternative 2 Hard Caps on Chinook Salmon

The benefits, in numbers of aggregate Western Alaska Chinook salmon that would potentially have accrued under Alternative 2, Option 1a, are shown in Table 5-16. The greatest benefits under this alternative, in numbers of Chinook salmon PSC reductions, would have occurred in 2005 and 2007 and under the most restrictive hard cap of 50,000 fish. The greatest benefits accrue in the CV sector where 31,754 and 34,930 Chinook salmon would have been avoided in 2005 and in 2007, respectively.

Under allocation scenario 1, total Chinook salmon PSC reductions in the CV sector under the 50,000 cap are estimated to range from zero to as high as 34,930 fish in 2007. The CP sector is estimated to have non-Chinook salmon saved of between zero and 5,954 (2007) under the 50,000 cap. The mothership sector estimates ranged from zero to 2,379 while the CDQ sector estimates ranged from zero to 2,400. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly lowering these numbers in all other sectors and sector allocation scenario 3 further increases CV non-Chinook salmon saved while further reducing the estimates in the other sectors.

As the hard cap level is increased to 200,000, and then to 353,000 fish, the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some cases only, from the CV sector.

Table 5-16 Estimated Aggregate West Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	1,613	2,723	1,886	18,241	627	2,209	1,214	14,527		2,015		10,029
2005	486	3,740	563	31,754	150	2,850	475	31,347		2,156	84	31,013
2006		1,269		20,479				19,225				
2007	2,400	5,954	1,733	34,930								
2008												
2009												
2010												
2011	316	1,576	2,378	12,431		1,451	2,368			510	2,336	
Total	4,815	15,262	6,560	117,834	777	6,511	4,058	65,099		4,681	2,420	41,042

4ii (sector allocation 2)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	1,101	2,560	1,849	18,288		2,015	402	14,903		426		13,299
2005	438	3,141	552	31,782		2,003	168	31,413				31,174
2006		1,056		20,578				19,537				18,948
2007	2,328	4,918	1,663	37,899								
2008												
2009				890								
2010												
2011	174	1,551	2,375	12,431			2,351				2,284	
Total	4,042	13,226	6,439	121,868		4,018	2,921	65,852		426	2,284	63,420

6 (sector allocation 3)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	743	2,301	1,849	18,334		1,374		17,430				14,685
2005	337	3,039	529	31,828				31,541				31,365
2006				20,664				19,961				19,246
2007		4,600	1,396	38,876								
2008												
2009				1,112								
2010												
2011	94	1,529	2,372	12,431			2,307	11,926				
Total	1,174	11,469	6,146	123,245		1,374	2,307	80,858				65,296

The impact of Alternative 2, option 1b, is shown in Table 5-17 below. In stark comparison to option 1a, the change in timing of option 1b to be a June-July closure results in increased estimated take of Chinook salmon. This is due to the fact that option 1a is a hard cap closure of the remainder of the B season, which resulting in fewer salmon, both chum and Chinook, being taken while delaying of pollock harvests until August and thereafter under option 1b concentrates effort into a time frame when Chinook PSC is highest. Under the most restrictive cap and allocation scenario 1 the potential effect of option 1b is to take more than 20,000 (2005) additional Chinook salmon, mostly in the CV sector. As the cap is increased the June-July closures occur later and displace less pollock effort into the later part of the season thereby reducing Chinook catch. For example, in 2005 in the CV sector increasing the cap would have lowered Chinook impacts from 18,002, to 13,027 and 9,275 as the cap is increased. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly lowering these numbers in all other sectors and sector allocation scenario 3 further increases CV non-Chinook salmon saved while further reducing the estimates in the other sectors.

Table 5-17 Estimated Aggregate West Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 2, Option 1b for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-2,005	-766	-203		-1,929	-141			-1,790		
2005		-2,177	-430	-18,002		-1,056	-426	-13,027			-406	-9,275
2006		-315		-8,850		-31		-7,411				-6,042
2007		-1,198	-342									
2008												
2009			-6	-355								
2010			-1									
2011	-357	-981	-2,109	-13,693		-668	-1,994	-3,674		-117	-1,644	
Total	-357	-6,676	-3,654	-41,103		-3,685	-2,561	-24,112		-1,907	-2,050	-15,317

4ii (sector allocation 2)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-1,969	-698	-1,465		-1,657				-576		
2005		-2,048	-439	-18,680			-418	-14,223				-11,475
2006		-114		-8,892				-8,411				-6,534
2007			-122									
2008												
2009			0	-620								
2010												
2011	-124	-879	-2,095	-13,949		-108	-1,694	-6,823			-1,447	
Total	-124	-5,010	-3,355	-43,606		-1,765	-2,112	-29,458		-576	-1,447	-18,009

6 (sector allocation 3)

Cap:	**15,600**				**62,400**				**110,136**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-1,962	-632	-3,254		-684						
2005		-2,008	-434	-19,535			-279	-14,791				-13,216
2006		-62		-9,068				-8,694				-7,953
2007				-2,139								
2008												
2009				-898								
2010												
2011		-739	-2,087	-14,281			-1,521	-9,933			-728	-3,815
Total		-4,771	-3,154	-49,174		-684	-1,800	-33,419			-728	-24,985

5.10 Effects of Alternative 3 Chinook Salmon

As is discussed in Chapter 6 of the accompanying EA, under the Alternative 3 analysis, Chinook PSC could potentially be reduced from current levels given the modifications to the RHS programs which explicitly link the cessation of chum measures to a Chinook threshold. Under the status quo RHS program, the regulations require that chum closures are called whenever chum rates exceed a base rate threshold. Prior to the modifications of the RHS regulations following Amendment 91, the RHS was designed for both Chinook and chum closures. Under that program, Chinook closures were given priority over chum closures to ensure the conservation of Chinook PSC. When Chinook provisions were removed from the regulations due to the Amendment 91 Chinook PSC management program implementation in 2011, there was no longer any recognition in the now chum-only RHS program of the priority on Chinook. As a result, under status quo, chum closures continue to move the fleet around and at times into areas of higher Chinook well into September and October when Chinook rates tend to be higher. Under the revised RHS, the Chinook threshold provides a benchmark whereby chum closures cease once the threshold for the Chinook rate (0.035 Chinook/mt pollock) is reached. This will avoid any exacerbation

of Chinook PSC due to area closures for chum. Analysis of this threshold indicates that it is reached in every year 2003-2011 between the dates of August 25 and September 15 (depending upon the individual year). Analysis of 2011 (only) indicated that the rates inside and outside of the chum closures were similar for Chinook, thus these closures may not in fact be exacerbating Chinook PSC levels (EA Table 5-41). Thus while the potential exists for this flexibility in the RHS program to reduce Chinook PSC, currently available data are insufficient to detect a significant reduction and Chinook PSC levels are assumed to approximately status quo.

5.11 Effects of Alternative 4 Triggered Closures on Chinook Salmon

The potential effect of the triggered area closure of Alternative 4, Option 1a, is presented in Table 5-18 below. The greatest benefits under this alternative, in numbers of Chinook salmon PSC avoided, would occur 2005 and 2007, and under the most restrictive hard cap of 25,000 fish with the greatest benefit coming from the CV sector.

Table 5-18 Estimated Aggregate West Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	140	627	393	-3,427	23	609	381	-2,013	-34	540	243	182
2005	2	375	90	18,743	2	307	46	18,626		267		18,208
2006		259	18	11,637		154		11,243				10,475
2007	328	2,057	2	19,584	306	1,819	-2					
2008												
2009	-2		0	804								
2010												
2011	176	518	2,127	12,026	165	518	2,128	11,946		460	2,125	
Total	644	3,835	2,630	59,368	496	3,407	2,553	39,801	-34	1,266	2,368	28,865

4ii (sector allocation 2)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	167	619	400	-3,194	-5	566	304	-3,324		480		-297
2005	2	359	77	18,843	2	272	6	18,662		202		18,205
2006		177		11,678				11,362				10,685
2007	314	1,966	0	20,834	7	1,597		-1,499				
2008												
2009			0	806								
2010												
2011	161	518	2,128	12,026	47	499	2,126	12,026			2,112	
Total	644	3,638	2,605	60,993	52	2,933	2,436	37,228		682	2,112	28,594

6 (sector allocation 3)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	43	617	392	-3,324	5	534	260	-3,543		237		-3,582
2005	2	302	54	18,941		262		18,711				18,407
2006		151		11,717				11,529				11,069
2007	306	1,791	-1	23,807				10,454				
2008				1,795								
2009				821				451				
2010												
2011	159	518	2,128	12,026		443	2,125	12,026			2,020	11,248
Total	510	3,380	2,574	65,783	5	1,238	2,384	49,627		237	2,020	37,142

Under allocation scenario 1, total Chinook salmon PSC avoided in the CV sector under the 25,000 cap are estimated to range from a negative value to as high as 19,584 fish in 2005. The CP sector is estimated to have Chinook salmon PSC reductions of between zero and 2,057(2007) under the 25,000 cap. The mothership sector estimates ranged from negative to zero to 2,117 (2011), while the CDQ sector estimates ranged from negative to 328 Chinook salmon. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector in most years while slightly lowering these numbers in other sectors in most years. Sector allocation scenario 3 further increases CV non-Chinook salmon saved while generally reducing the estimates in the other sectors. As the hard cap level is increased to 75,000 and 200,000 fish the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some cases only, from the CV sector.

The impact of Alternative 4, option 1b, is shown in Table 5-19. Similar to Alternative 2, options 1a and 1b, the change in timing of option 1b to be a June-July closure results in increased estimated take of Chinook salmon. This is due to the fact that option 1a is a hard cap closure of the remainder of the B season, which resulting in fewer salmon, both chum and Chinook, being taken while delaying of pollock harvests until August and thereafter under option 1b concentrates effort into a time frame when Chinook PSC is highest. Under the most restrictive cap and allocation scenario 1 the potential effect of option 1b is to take more than 15,500 (2005) additional Chinook salmon, mostly in the CV sector. As the cap is increased the June-July closures occur later and displace less pollock effort into the later part of the season thereby reducing Chinook catch. For example, in 2005 in the CV sector increasing the cap would have lowered Chinook impacts from 15,493, to 11,398 and 9,391 as the cap is increased. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while slightly lowering these numbers in all other sectors and sector allocation scenario 3 further increases CV non-Chinook salmon saved while further reducing the estimates in the other sectors.

Table 5-19 Estimated Coastal Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 1b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-66	-346	-549	-2,607		-329	-483			-315	-86	
2005		-26	0	-15,493		-25	-18	-11,398		-1	-7	-9,391
2006		50		-4,813		49		-4,492		-1		-3,423
2007		-27	-15	-717								
2008												
2009	-1	-1	4	-76				-9				
2010			-2									
2011	-4	-24	-684	-6,729	-2	-14	-667	-5,327		-13	-562	-1,523
Total	-71	-373	-1,246	-30,436	-2	-318	-1,168	-21,226		-330	-655	-14,336

4ii (sector allocation 2)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-339	-539	-4,002		-317	-444			-240		
2005		-25	-8	-15,987		-16	-3	-12,831			-2	-9,975
2006		49		-4,861		8		-4,531				-4,145
2007		-16	-15	-1,658								
2008												
2009			5	-112				-15				
2010			1	-146								
2011	-3	-14	-681	-6,768		-13	-638	-5,463		2	-267	-2,508
Total	-3	-344	-1,237	-33,534		-337	-1,085	-22,840		-238	-269	-16,629

6 (sector allocation 3)

Cap:	7,800				23,400				62,400			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-330	-526	-4,821		-315	-221	-798		-4		
2005		-25	-8	-18,090		-2	-16	-14,206				-10,507
2006		49		-4,888				-4,603				-4,405
2007			-15	-3,078								
2008				-114								
2009			-1	-240				-32				
2010				-325								
2011	-2	-14	-677	-6,878		-12	-592	-5,982			-122	-3,302
Total	-2	-320	-1,227	-38,435		-329	-829	-25,621		-4	-122	-18,214

The potential effect of the triggered area closure of Alternative 4, Option 2a, is presented in Table 5-20 below. The greatest benefits under this alternative, in numbers of Chinook salmon PSC avoided, would occur 2006, and in 2011, and under the most restrictive hard cap of 25,000 fish with the greatest benefit coming from the CV sector.

Under allocation scenario 1, total Chinook salmon PSC reductions in the CV sector under the 25,000 cap are estimated to range from negative values in 2004 and 2005 to as high as 12,244 fish in 2011. The CP sector is estimated to have Chinook salmon PSC reductions of between zero and 974 (2007) under the 25,000 cap. The mothership sector estimates ranged from negative to zero to 2,103 (2011), while the CDQ sector estimates ranged from negative to 318 Chinook salmon. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector in most years while slightly lowering these numbers in other sectors in most years. Sector allocation scenario 3 further increases CV non-Chinook salmon saved while generally reducing the estimates in the other sectors. As the hard cap level is increased to 75,000 and 200,000 fish the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some

cases only, from the CV sector, and that CV sector effects are persistently negative (greater catch of Chinook) in the 2004 and 2005 years under all caps and allocation scenarios.

Table 5-20 Estimated Aggregate West Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2a, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	120	335	400	-5,540	1	329	389	-5,345	-31	274	243	-1,303
2005	2	134	77	-1,207	2	108	44	-1,319		79		-1,707
2006		212	0	10,230		138		9,954				9,459
2007	318	974	2	7,835	297	737	-2					
2008												
2009	-2		0	773								
2010												
2011	180	396	2,103	12,244	170	396	2,104	12,201		359	2,103	
Total	617	2,052	2,582	24,335	470	1,710	2,535	15,491	-31	712	2,346	6,449

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	147	326	401	-5,211	-21	282	315	-6,430		262		-1,854
2005	2	122	65	-1,158	2	81	6	-1,268		70		-1,711
2006		150		10,247				10,056				9,604
2007	305	879	0	9,504		466		-12,439				
2008												
2009			0	774								
2010												
2011	168	397	2,104	12,244	61	383	2,102	12,244			2,071	
Total	622	1,874	2,570	26,400	42	1,213	2,423	2,163		333	2,071	6,039

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	21	335	402	-5,366	5	274	260	-6,062		79		-6,332
2005	2	105	42	-1,088		77		-1,219				-1,536
2006		136		10,282				10,170				9,800
2007	297	707	-1	13,817				-4,445				
2008				1,795								
2009				784				415				
2010												
2011	163	396	2,104	12,244		342	2,103	12,244			1,996	11,557
Total	483	1,679	2,548	32,467	5	693	2,363	11,103		79	1,996	13,490

The impact of Alternative 4, option 2b, is shown in Table 5-21. Similar to both Alternatives 2 and 4, option 1b, the change in timing of option 1b to be a June-July closure results in increased estimated take of Chinook salmon. This is due to the fact that the “a” options are hard cap closure of the remainder of the B season, which resulting in fewer salmon, both chum and Chinook, being taken while delaying of pollock harvests until August and thereafter under the “B” options concentrates effort into a time frame when Chinook PSC is highest. Under the most restrictive cap and allocation scenario 1 the potential effect of option 2b is to take more than 10,350 (2005) additional Chinook salmon, mostly in the CV sector. As the cap is increased the June-July closures occur later and displace less pollock effort into the later part of the season thereby reducing Chinook catch. For example, in 2005 in the CV sector increasing

the cap would have lowered Chinook impacts from 10,364, to 6,461 and 5,042 as the cap is increased. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sector while very slightly lowering these numbers in some other sectors and years; however, the CP sector impacts do not change as the allocation scenario is changed. Allocation scenario 3 further increases CV non-Chinook salmon saved while further reducing the estimates in the CDQ and mothership sectors.

Table 5-21 Estimated Aggregate West Alaska Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 4, Option 2b, for 2004-2010 for the B season.

2ii (sector allocation 1)

Cap:	**7,800**				**23,400**				**62,400**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-58	-60	-254	-2,408		-60	-249			-60	-86	
2005		1	13	-10,364		1	-4	-6,461		1	4	-5,042
2006		36		-3,436		36		-3,145				-2,186
2007				-78								
2008												
2009			6	-50				-9				
2010			-2									
2011	-1		-441	-4,147			-424	-3,040			-366	-231
Total	-60	-23	-678	-20,483		-23	-677	-12,655		-60	-448	-7,459

4ii (sector allocation 2)

Cap:	**7,800**				**23,400**				**62,400**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-60	-249	-3,727		-60	-243			-56		
2005		1	6	-10,796		1	10	-7,719			4	-5,249
2006		36		-3,484				-3,183				-2,862
2007				-351								
2008												
2009			7	-83				-13				
2010			0	-12								
2011	-1		-438	-4,183			-395	-3,115			-164	-621
Total	-1	-23	-674	-22,635		-60	-628	-14,030		-56	-160	-8,732

6 (sector allocation 3)

Cap:	**7,800**				**23,400**				**62,400**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-60	-249	-4,079		-60	-170	-798				
2005		1	5	-12,693			0	-9,078				-5,735
2006		36		-3,510				-3,254				-3,058
2007				-1,004								
2008				-114								
2009			0	-166				-16				
2010				-25								
2011			-434	-4,293			-385	-3,410			-69	-1,358
Total		-23	-678	-25,883		-60	-555	-16,557			-69	-10,151

6.0 Pollock Industry Impact Analysis

This section examines the expected potential impacts on the pollock industry's gross revenues attributable to potential reductions in pollock products being delivered to market as a result of fishery closure (potentially forgone gross revenue) or due to relocation of effort outside of a closure area (revenue at risk)[8]. To better place these impacts in a comparable empirical context, an analytical approach is adopted here, in which the question evaluated is expressed as follows: "What would the effects of these alternatives have been, had each, in turn, been in place in 2004 through 2011" By posing the analytical question in this way, it is possible to use actual empirical information and official data records on fleet participation, catch composition, production patterns, first wholesale prices, PSC quantities, spatial and temporal distribution of effort, and geographical patterns of deliveries to primary processors or transshipping facilities. These estimates can provide at least a crude empirical measure of the potential economic impact of the alternatives on different fleet sectors. Moreover, if it is assumed that harvest foreclosed to a fleet sector could not have been made up elsewhere by that fleet sector, then the forgone or at-risk estimate becomes an approximation of the potential maximum forgone gross revenues directly attributable to the proposed action.

The Council has chosen to consider the proposed action because of high numbers of non-Chinook salmon PSC in the Bering Sea pollock fishery. The analytical timeframe was chosen because it represents the most recent time period that is most reflective of recent fishing patterns. Those status quo conditions include observed high levels of non-Chinook salmon PSC under present regulations that provide an exemption to Chum 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.

The analysts acknowledge that the use of potentially forgone first wholesale gross revenues is not an ideal reflection of the expected economic impacts (or, conversely, benefits if the catch reduction can be mitigated by actions of the operator) attributable to the proposed changes in non-Chinook PSC management. However, 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 as the Council develops a socioeconomic data collection program that requires the pollock 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.

The ability to mathematically derive net economic welfare measures is fundamentally dependent upon empirical data on 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. 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.

[8] "Revenue at risk" should be regarded as an upper-bound estimate. That is, it represents a projection, based upon historical effort and landings data, of the gross value of the catch that would be forgone as a result of one or more provisions of the proposed action, assuming none of that displaced catch could be made up by shifting effort to another area. In many cases, this will not be the case. Therefore, the true impact on gross revenue is likely to be smaller than the estimated revenue at risk, although that is not assured.

Without 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) gross revenues cannot be regarded as indicative of net results. That said, these estimates represent the current limit of NMFS's ability to empirically characterize the expected outcome for each sector in the pollock fishery, from the changes in non-Chinook PSC 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.

It must also be understood that the proposed action is not to close the pollock fishery; it is to create incentives for pollock fishermen to avoid non-Chinook salmon. Thus, the impacts are reported as potentially forgone gross revenue or gross revenue at risk, depending on alternative, and are not reported as industry losses of revenue. 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 PSC. Clearly, the Council's intent is to incentivize non-Chinook salmon PSC avoidance in order to reduce it and the hard cap used in the potentially forgone gross 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 gross revenue, and/or gross revenue at risk estimated in the analysis as direct losses in revenue due to direct contraction in pollock harvest.

Thus, it is acknowledged that the gross revenue estimates shown in this analysis reflect highly simplified assumptions about the outcome of competing alternative PSC 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 non-Chinook PSC prohibition actions being examined. There is no expectation that this outcome will be realized as a result of any of the proposed non-Chinook PSC management measures under consideration, and 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.

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, and 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. Thus, this analysis will first provide qualitative discussions of the potential effects. The qualitative treatment is then followed by the revenue analysis.

6.1 Fleet Operational Effects

Under the alternatives to the status quo, fishermen would be expected to attempt to minimize losses associated with potentially forgone gross revenue and/or gross revenue placed at risk by altering their current operations. These reactions could include the following: (1) mitigating a triggered area closure by re-deploying fishing effort, using the same fishing gear and methods, to known adjacent fishing grounds that may be equally or only somewhat less productive (similar CPUE) than the fishing grounds lost to the salmon PSC minimization measure; (2) avoiding non-Chinook salmon PSC by re-deploying fishing effort to an area of unknown productivity and operational potential, using the identical fishing gear, in an exploratory mode; (3) switching to a different target fishery if possible; and (4) mitigating the risk of a hard cap induced closure by speeding up harvesting and processing activities (race for fish). Each of these strategies may have operational cost implications as described below. While empirical data on operating cost structure at the vessel or plant level are not available, cost trends for key inputs may shed

some light on the probable impacts of the fishing impact minimization alternatives on the pollock industry in the aggregate and on average.

Any regulatory action that requires an operator to alter his or her fishing pattern, whether in time or space, is likely to impose additional costs on that operator. The alternative non-Chinook salmon PSC minimization actions may affect the operating costs of the pollock fleet, compared to the status quo condition, **with the degree of those effects necessarily dictated by the extent to which hard cap and/or triggered closures constrain harvests.** The following sections address this issue in terms of both fixed and variable costs. Fixed costs tend to arise from investment decisions and variable costs arise from short-run production decisions. As the terms imply, fixed costs are those that do not change in the short run, no matter what the level of activity. Variable costs, on the other hand, are those costs that do change directly with the level of activity, recognizing that variable inputs must be used if production exceeds zero.

6.1.1 Fixed Costs

As suggested earlier, many costs confronting operators in these fisheries are fixed; that is, they do not change with the level of production. Fixed costs include such expenses as debt payments, the opportunity cost of the investment in the vessel (or plant), the cost of having the vessel or plant ready to participate in the fisheries, some insurance costs, property taxes, and depreciation. Following an action that negatively affects, for example, CPUE, TAC, or catch share, these fixed costs must be distributed across a smaller volume of product output, raising the average fixed cost per unit of production. As previously noted, available information on the cost structure of operations fishing for and processing pollock is very limited. This is largely so because cost information is often considered highly proprietary by industry members and is, under the best of circumstances, expensive to collect and analyze. Only scattered anecdotal information at the operation level is available on fishing costs (fixed or variable). It is, therefore, impossible to do more than provide a qualitative discussion of the impact of the proposed alternatives on pollock industry's operating costs.

6.1.2 Variable Costs

Of all the categories of variable factor costs, fuel ranks at or near the top of the list of operating expenses in the fisheries under consideration. Even a qualitative evaluation of the elements of the non-Chinook salmon PSC minimization actions of Alternative 3 (e.g., triggered area closures) suggest that the proposed regulatory changes may likely result in the following: 1) longer average trip duration to travel to remaining open fishing grounds; 2) greater total distances traveled per trip, perhaps under more extreme operating conditions. In addition, the non-Chinook salmon PSC minimization actions of Alternative 2 (e.g., hard caps) may induce a race for fish that could result in vessels operating at maximum speed and capacity in order to harvest as much pollock as possible prior to a hard-cap-induced fishery closure. Figure 6-1 provides representative diesel fuel cost information for the Bristol Bay area and for Dutch Harbor. These data, provided by the Pacific States Marine Fisheries Commission Economic Information System, clearly show that diesel fuel prices more than doubled in the region between 2005 and 2008 and approached $6 per gallon in the Bristol Bay area in 2008. These increases have likely had a severe impact on the variable costs of all fishing operations in the region, including those for non-Chinook salmon. While it is true that some fuel is purchased by the pollock fleet in other areas, such as Seattle, there is, at present, no comprehensive accounting of costs or expenditures in the pollock fishery that would allow analysis of actual fuel consumption and costs.

How changes in running time would affect fuel costs depends on how much fuel must be burned per unit catch. While it is not possible to place a numerical estimate on this factor, it is reasonable to conclude that, on average, total fuel consumption would potentially increase, due to movement to avoid non-Chinook salmon, relative to the status quo under each of the proposed alternatives provided that a hard

cap had the potential to be reached and/or a trigger closure level of PSC was expected to be reached. This increased fuel use would apply except in the case of vessels that cease to fish as a result the non-Chinook salmon PSC minimization measures, and perhaps in the case of vessels that switch to a different fishery, although opportunities to do the latter are highly restricted for the AFA pollock fleet.

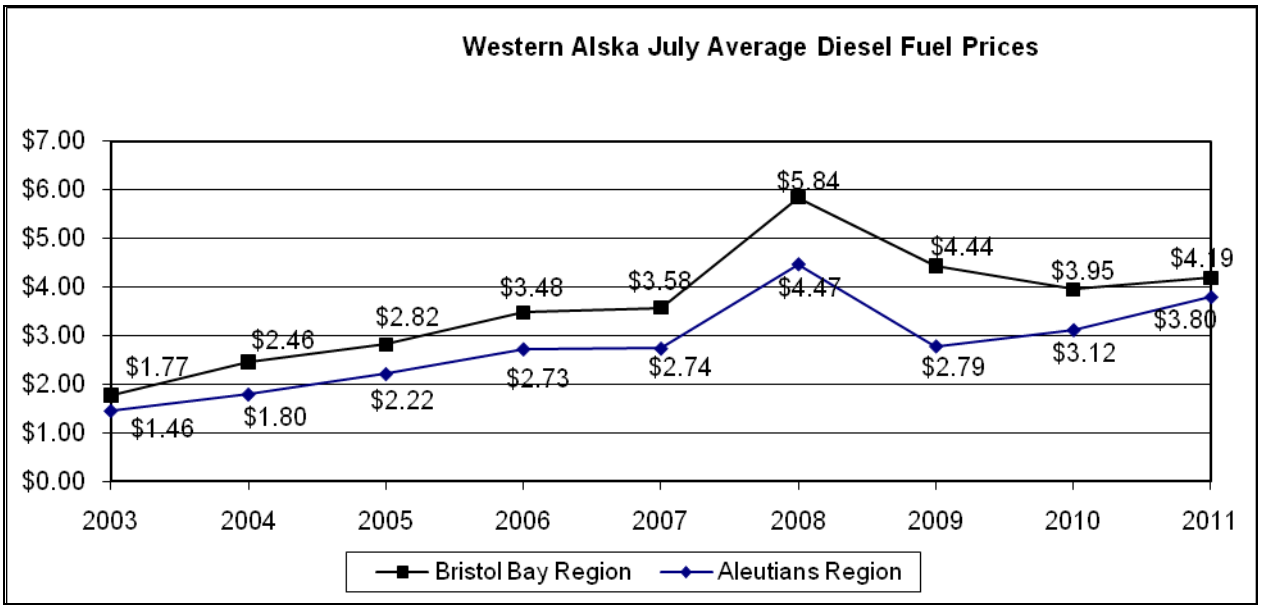


Figure 6-1 Representative Diesel fuel costs from western Alaska, 2001-20011 ($/gallon).

What economists refer to as the 'opportunity cost' of labor is another variable cost that may increase by triggered closure scenarios contained within Alternative 3. Measures that increase fishing time would reduce the time available for other activities and, in so doing, would impose a cost on fishermen. Several of the contemplated measures may increase the time required for fishing in affected fisheries. As noted elsewhere, avoiding non-Chinook salmon PSC may increase transit time to and from fishing grounds; fishermen may be forced to fish on grounds with lower CPUE, thus increasing the time required to harvest any given amount of fish; or they may force fishermen to learn new fishing grounds, thus increasing fishing time, at least initially. Because fishing crew members are generally paid with shares of an operation's net (or modified gross) revenues, the additional time spent at sea as a result of these measures may actually decrease crew earnings, if the operating expenses of the fishing vessel increase.

This opportunity cost is also reflected in lost time, which reduces the individual's opportunities to engage in other activities and is treated as a cost in economic benefit/cost analysis. The limitations of available models for predicting how fishing operations would behave, given the constraints, and the limited amount of cost information available for fishing operations, make it impossible to make quantitative estimates of the change in fishing hours or days associated with these alternatives, or to make monetary estimates of the changes in associated opportunity costs.

Clearly, upon attainment of a hard cap, some portion of TAC would remain unharvested, representing forgone gross revenue; however, triggered closures may increase the cost of fishing per unit of the pollock that continue to be caught. Based on information provided by the industry at public meetings and through individual contacts, as well as the professional judgment of the preparers of this RIR, seven categories of costs were defined for consideration, as follows:

- Increased travel costs

- Costs of learning new grounds or using new or modified gear (e.g. excluder devices)
- Costs of PSC avoidance measures, or (if these efforts are unsuccessful) premature closure due to excessive PSC
- Reduced pollock CPUE due to less concentrated target stocks;
- Potential gear conflicts
- Effects on processors (floating or shoreside) built for higher throughput
- Safety impacts (addressed separately below in section 6.1.3)

Increased Travel Costs

Vessels that had formerly been able to fish areas nearer shore, and in relative proximity to their preferred port of operation, could be pushed farther offshore and/or into more remote fishing areas, as a result of specific provisions contained in Alternative 3. Running to the remaining open fishing areas, prospecting for harvestable concentrations of target species, then (depending on operating mode) running back to port with raw catch or product would, as previously noted, require increased expenditures of fuel and other consumable inputs, as well as more time on the water (i.e., trips may be longer, and all variable operating costs and wear and tear on equipment and crew would increase). These changes in fleet operating patterns would likely require a greater total number of days for a given vessel to take its share of the available TAC, other things being equal.

How many additional days may be required would vary by stock and ocean conditions, by rates of success in locating fishable concentrations of the target species in remaining open areas or time periods, by operational mode and capacity, by the level of aggregate effort exerted by the fleet or sub-sector in the remaining open areas, and by other factors. But clearly, if catch per unit effort declines, cost per unit of catch would increase. Smaller vessels may be so disadvantaged by the distances that must be traversed between port and open fishing grounds that they may be unable to operate economically (perhaps, even physically) under these circumstances. While the formation of the triggered closure areas specifically recognizes areas with high non-Chinook PSC but relatively low catches of pollock, implying little or no impact on CPUE from relocation of effort, it is still important to recognize that the limitations of a retrospective analysis absent behavioral feedbacks prevent one from saying definitively that vessels would be able to make up gross revenue at risk with little or no additional cost.

The smallest, least mobile vessels could be effectively closed out of some fisheries. Even vessels that have the capacity to reach open fishing grounds may incur prohibitively high operating costs (e.g., excessive fuel consumption), increased risk (e.g., should sea or weather conditions change unexpectedly), and reduced product quality (i.e., as hold-time increases). Longer distances and more time in transit mean higher operating costs and less time fishing.

Costs of Learning New Grounds or Using New Gear

It is axiomatic that fishermen fish when and where they believe the fish are most valuable and most readily available. Under the triggered closure area provisions, triggered closures would compel operators to alter the pattern of operations they would voluntarily choose to maximize profits. That is, in many instances, fishermen would be required to fish on grounds with which they may be unfamiliar. Fishermen would face a learning curve on these new grounds. They would have to become accustomed to a new physical geography underwater and perhaps more extreme and/or exposed sea surface conditions, to new fish locations, behaviors, and habits, and, importantly, to new patterns of PSC.

While fishermen learn to operate within these new parameters, they would likely incur increased operating costs. Gear could be more frequently lost or damaged, and while it is not clear that CPUE would be lower PSC of other species could be higher. Higher PSC could force early closures of fishing grounds, and with fewer optional open areas available, it would be more difficult (and, thus, more costly)

for operators to voluntarily move off hot spots to reduce or avoid PSC of both non-Chinook salmon and other prohibited species.

Costs of PSC Avoidance Measures

While, as a general rule in pollock trawl fishery, the selectivity of the gear fished varies, pollock fishermen unavoidably take other species as incidental catch when they fish for pollock. In some instances (e.g., PSC of halibut, salmon, herring, and some species of crabs), pollock fishermen are subject to limitations on the amounts of PSC that they may take. When the PSC limits (or caps) are reached, the fishery is closed. Fishermen can, to a greater or lesser degree, reduce PSC by modifying their gear or the way they use it, and by learning the times and places when unacceptably large PSC might take place (Queirolo et al. 1995). Both PSC and the avoidance measures that they make necessary impose costs on the operations. Finally, with temporal and geographic dispersion provisions associated with the triggered closure alternative, there is the potential for increased interactions with protected species (e.g., short-tailed albatross, ESA-listed PNW Chinook salmon), which could require Section 7 consultation (with the potential to trigger further and more extensive fishing closures).

Reduced CPUE Due to Less Concentrated Target Stocks

The economic, operational, and socioeconomic response of individual operators may take several forms following adoption of a triggered closure. For example, anecdotal information supplied by the industry in public meetings and through individual contacts suggests that CPUE may decline, in some cases substantially, as a result of significant fishing effort being forced into unfamiliar or unfavorable areas. The effect of these declines would not likely be uniformly distributed across each management area, gear type, processing mode, or vessel size category and, thus, would carry with them very different implications for profitability, economic viability, and sustained participation in these fisheries.

Potential Gear Conflicts

Concerns have been expressed, from a variety of sources, about the adverse economic effects associated with forcing gear-specific effort out of traditional operating areas and into proximity with other gear groups and/or target fisheries. Trawl gear, pot gear, and longline gear are incompatible when fished simultaneously in a given area. Gear damage or loss is a common outcome when these competing fishing technologies come into contact with one another on the fishing grounds. Each gear group perceives itself as facing unique operating challenges with respect to such conflicts. For example, Pacific cod longline fisheries occur north of the Pribilof Islands at the same time that bottom trawl fisheries target flathead, yellowfin, and rock sole in the same area. By voluntarily isolating themselves in well-defined and generally recognized areas, they insulate themselves from the high cost and frustration associated with gear conflicts (loss of longline gear and catch). If either a total pollock fishery closure and/or a triggered closure induced pollock vessels to switch, to the extent that sideboard regulations allow, to bottom trawl fishing on the flatfish fishing grounds gear conflicts could emerge. The likelihood of occurrence and magnitude of any such conflict is speculative at this time.

Effects on Processors Built for Higher Throughput

If CPUEs decline and fishing is more geographically dispersed under the triggered closure alternative, the aggregate rate of catch could slow. This implies that the rate of delivery to processors would also decline. Because existing processing plant capacity has been built, in many cases, for peak through-put (i.e., to maximize the rate at which catch is received and processed in response to the race-for-fish on the grounds), lower and slower deliveries may not supply sufficient quantities of raw fish for the largest plants to operate profitably. Many plants have been designed, configured, and operated to exploit economies-of-scale in production. They are designed to move an optimal volume of fish through the processing plant at the most efficient, most cost effective rate, given the capacity of the facility and expectations of catch and delivery rates from the catcher-vessel fleet. If operated at rates that significantly deviate from those for which the plant was designed, these economies would be lost, and a plant could become unprofitable to operate.

The nature of these interactive and compounding relationships is important to keep in mind. None of these economic, operational, or logistical elements works in isolation from one another. Further, while many of these considerations have specifically been identified as being related to relocation of effort under a triggered closure alternative, they may also affect overall fleet operations under the threat of a hard cap induced total, and/or sector level, pollock fishery closure. Given the level of cooperation that exists within the pollock industry presently, and the fact that the VRHS ICA is a system conceived and implemented by industry (before Amendment 84 regulations took effect) for proactive PSC avoidance, it is not unreasonable to expect that the pollock industry may continue to operate the VRHS ICA, or some variant of it, in order to try to prevent attainment of a hard cap. As such, they would invoke various closures upon their membership that could have similar effects on operational costs as described above for Alternative 3. It follows that these cost impacts are presently being felt by the members of the ICA due to VRHS closures under the status quo and would also likely continue under the VRHS/80% closure option of Alternative 4.

6.1.3 Safety Impacts

Commercial fishing is a dangerous occupation. Lincoln and Conway, of the National Institute of Occupational Safety and Health (NIOSH), estimate that, from 1991 to 1998, the occupational fatality rate in commercial fishing off Alaska was 116 persons per 100,000 full time equivalent jobs, or about 26 times the national average of 4.4/100,000 (Lincoln and Conway 1999). Fatality rates were highest for the Bering Sea crab fisheries. Groundfish fishing fatality rates, at about 46/100,000, were the lowest of the major fisheries identified by Lincoln and Conway. Even this relatively lower rate was about ten times the national average (Lincoln and Conway 1999).

During most of the 1990s, commercial fishing appeared to become relatively safer. While annual vessel accident rates remained comparatively stable, annual fatality per incident rates (case fatality rates) dropped. The result was an apparent decline in the annual occupational fatality rate. From 1991 to 1994, the case fatality rate averaged 17.5 percent per year; from 1995 to 1998 the rate averaged 7.25 percent per year. Lincoln and Conway report that, “The reduction of deaths related to fishing since 1991 has been associated primarily with events that involve a vessel operating in any type of fishery other than crab” (Lincoln and Conway 1999, page 693). Lincoln and Conway described their view of the source of the improvement in the following quotation. “The impressive progress made during the 1990s, in reducing mortality from incidents related to fishing in Alaska, has occurred largely by reducing deaths after an event has occurred, primarily by keeping fishermen who have evacuated capsized (sic.) or sinking vessels afloat and warm (using immersion suits and life rafts), and by being able to locate them readily, through electronic position indicating radio beacons” (Lincoln and Conway 1999, page 694).

There could be many explanations for this improvement. Lincoln and Conway point to improvements in gear and training, flowing from provisions of the Commercial Fishing Industry Vessel Safety Act of 1988 that were implemented in the early 1990s. Other causes may be improvements in technology and in fisheries management. Technological improvements may include advances in Emergency Position Indicating Radio Beacon (EPIRB, sometimes also called an ELT or Emergency Locator Beacon) technology. Current 406 MHz EPIRBs are more effective as a means of communicating distress than the 121.5 MHz EPIRBs in use in the early 1990s, in that they now transmit a unique identification code in addition to position information, which allows USCG personnel ashore to quickly identify the vessel, use point of contact telephone numbers, and more effectively filter out false alarms.

Fishery management changes have included the introduction of individual quotas for halibut and sablefish, actions that have dramatically slowed the historically frenetic pace of these fisheries. The introduction of co-ops in the pollock fisheries in 1999 and 2000 is not reflected in these statistics. Rationalization of the pollock fishery in the BSAI, however, may have furthered safety improvements.

The Lincoln-Conway study implies that safety can be affected by management changes that affect the vulnerability of fishing boats, and thus the number of incidents, and by management changes that affect the case fatality rate. These may include changes that affect the speed of response by other vessels and the USCG. Starting in 1997, the Coast Guard's Seventeenth District instituted a practice of forward deploying a long range search helicopter to Cold Bay, Alaska, to improve agency response time during the Bristol Bay red king crab fishery. This practice was expanded in 1998 to cover the snow crab fishery. In 1999, approximately 11 lives were saved, in a 6-day period of extreme weather, when the forward deployed helicopter responded to several vessel sinkings and other marine casualties in short order.

In this RIR, several safety-related issues have been considered with respect to the alternatives. These include the following:

1. Fishing farther offshore,
2. Reduced profitability, and
3. Changes in risk.

Fishing Farther Offshore

Changes in fishery management regulations that result in vessels, particularly smaller vessels, operating farther offshore appear likely to increase the risk of property loss, injury to crew members, and loss of life. Non-Chinook salmon PSC minimization measures that close nearshore areas to fishing operations, such as the closures of Alternative 2 and 4, could compel vessel operators to choose between assuming these increased risks or exiting these fisheries entirely. Weather and ocean conditions in the BSAI are among the most extreme in the world. The region is remote and sparsely populated, with relatively few developed ports. The commercial fisheries are conducted over vast geographic areas. While many vessels in these fisheries are large and technologically sophisticated, some are relatively small vessels with limited operational ranges.

Several factors associated with fishing farther from shore can reduce the safety of fishing operations by increasing the likelihood of emergency incidents. Vessels would probably have to spend more time at sea in order to take a given amount of fish. It would take more time to travel between port and the remaining open fishing grounds. Operators would also be likely to be fishing in less familiar conditions and on stocks that may be less highly aggregated, thus reducing CPUE. Increases in the time spent at sea increase the length of time fishermen are potentially exposed to accidents. Furthermore, longer trips are likely to increase fatigue and thus the potential for mistakes and accidents.

Other factors may tend to increase the case fatality rate. Fishing vessels may be farther from help if an accident occurs. In many cases, the initial response to trouble comes from other fishermen. If fishing farther offshore, on more extensive fishing grounds, increases the dispersion of the fishing fleet, assistance from other fishermen may not be as readily available. In addition, regulatory actions that force fishing vessels to work farther offshore may turn what would normally have been a request for assistance search and rescue case into an emergency or life threatening situation. Many search and rescue cases involving fatalities start as a casualty to the vessel that degrades its stability or survivability, but does not immediately threaten the vessel or crew. After the initial casualty, other environmental factors (e.g., heavy seas, winds, freezing spray, etc.) may quickly cause the situation to deteriorate. The ability to render assistance early is essential. Vessels fishing farther from shore and/or in more remote and exposed locations may experience additional delays before help can arrive.

In a similar respect, the ability to satisfactorily treat personnel injuries is often determined by the speed with which the injured can receive adequate medical attention. While these factors may affect all operations, they are likely to be most serious for the smaller vessels based in Alaska ports, which have tended to fish relatively close to the shore in the past.

Reduced Profitability

As discussed throughout this RIR, proposed restrictions on fishing to minimize non-Chinook salmon PSC could reduce the profitability of many operations, especially including many of the smaller operations. Reduced profitability could be an indirect cause of higher accident rates. For example, fishermen facing a profit squeeze could defer needed maintenance on vessels and equipment, reduce operating costs by cutting back on safety expenditures, or scale back the size of their crew in order to reduce crew share expenses. Remaining crew would have expanded responsibilities and could risk greater fatigue, increasing the likelihood of accidents. Finally, these operators could decide to fish more aggressively, even in marginal conditions, in an effort to recoup lost gross revenues. These factors may affect the incident rate and the case fatality rate, as well.

Changes in Risk

Each of the factors described above increases risk. On the other hand, the potential for increased risk may be offset to some extent by changes in fleet behavior. An increase in risk effectively increases the cost of each additional day of fishing that, in turn, may contribute to reduced levels of participation (e.g., fewer fishing days) by smaller vessels. If this leads to a safety-induced reallocation of harvest from smaller to larger vessels, risk calculations may be affected. Similarly, smaller crew sizes mean that fewer people on a vessel are exposed to danger. Furthermore, skippers who have less invested in safety gear may have an incentive to behave more cautiously or conservatively in other respects in order to offset some of this perceived increased risk. Very little is known about factors that might increase risk, or that might offset risk increases, for fishermen in the North Pacific and Bering Sea. Even the best estimates of statistics as fundamental as the occupational fatality rate are not precise, and are not available at all for recent years. Rough estimates of the relative ranking of occupational fatality rates in different fisheries are known. Little more than qualitative speculation is available concerning the factors that affect the rates in the different fisheries, however. Available information does not permit quantitative modeling of changes in these rates in response to changes in fishery management regulations that could be induced by fishing impact minimization measures. These changes in fishing behavior and patterns could lead to an increased level of risk to vessels and crews, albeit an increase that cannot be empirically estimated.

Unfortunately, it is not possible to predict the changes in behavior that the industry might undertake to avoid non-Chinook salmon PSC 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 alternatives all 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 PSC 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 PSC cap.

6.1.4 Pollock Product Quality, Markets, & Consumers

This section discusses the economic impacts of the alternatives on (1) product quality and revenue impacts, including changes in the time between harvest and delivery and changes in the average size of pollock, (2) costs to consumers, (3) impacts on related fisheries, and (4) impacts of fishery dependent communities.

This RIR is developed in compliance with Executive Order 12866, which 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.

6.1.5 Product Quality & Revenue Impacts

The non-Chinook salmon PSC minimization alternatives considered in lieu of the status quo may impose restrictions on pollock fishing vessel operations that might lead to a decline in product quality and associated reductions in the price the industry receives for fishery products. Changes in product quality may occur for at least three reasons:

- If a triggered closure occurs, CV operations may have to fish farther away from shoreside processors, requiring them to travel greater distances taking more time to deliver their catch;
- If forced out of the most productive grounds, either by a triggered spatial closure or a voluntary hot spot closure, fishermen may be induced to target stocks of sub-optimal sized fish;
- If a hard cap threatens a fishery closure, a race for fish may occur and catcher processors and motherships may change product mix in order to speed up production, thereby possibly reducing product quality and/or finished product value.

These potential effects on product quality would all be expected to lower the value of payments to CV operators as well as returns to shoreside processing value added.

The interval between catching and initiating processing pollock is, reportedly, negatively correlated with product quality (and, thus, value). Some reports suggest that, on a product-for-product basis, the quality of pollock harvested and processed at-sea is uniformly higher than that of product produced onshore, owing primarily to the significant difference in the interval of time between catching and processing. Inshore processors routinely place limits on the maximum holding time for pollock onboard catcher vessels, and deduct from the price or refuse delivery if the delivery time is exceeded. For those vessels that do not have the capability to process their own catch, given a fixed catch rate and hold capacity, any action that substantially increases the time between catch and delivery imposes costs, both on the harvester and the processor. Beyond some point (which varies by vessel size, configuration, condition of the target fish, and weather/sea conditions) delivery of a usable catch (i.e., one with an economic value to the fisherman and processor) is not feasible.

In this latter connection, a concern common to all operators delivering catch ashore for processing is the effective time limit that exists from ‘first catch onboard’ until offloading to deliver a salable catch. Informed sources in the industry place the maximum interval at 72 hours (at least in the case of pollock). If fishing grounds that remain open under one or another of the fishing impact minimization alternatives are more remote from sites of inshore processing facilities than the traditional fishing locations, the delivery time for the raw product by the catcher vessel may be lengthened and the value of the delivered product lowered. For smaller vessels with more limited holding capacity and slower running speeds, this limit would impose relatively greater constraints (i.e., operational burdens). The result may be an effective intra-sectoral redistribution of catch share.

Closures (or other operational restrictions) of fishing grounds adjacent to inshore processing facilities may inadvertently redistribute the catch within a sub-sector, from the smaller, least operationally mobile vessels to the larger, faster, more seaworthy elements of the fleet. In the long run, this may have the added and undesirable effect of inducing further ‘capital stuffing’ behavior within the industry as those disadvantaged small boat owners perceive the need to invest in added capacity to continue to participate profitably in the fishery.

A corollary effect of altering the timing and/or location of catch might accrue if the average size of fish in the catch falls below the minimum requirement for specific product forms. These minimums are often

dictated by the marketplace, but may also be directly linked to the technical limits of the available processing technology. These impacts could accrue to any or all segments of the fishery. For example, on average, fillet production requires a larger pollock than surimi production. If spatial displacement (e.g. via a triggered area closure) results in a significant decline in the average size of fish harvested by a given operation, there could be adverse effects on product mix, quality, grade, and value.

In contrast to potential declines in product value that could occur, there may be upward price pressure due to reduced quantity of pollock supplied to markets if a PSC management measure results in forgone pollock catch. The economic law of demand (e.g., a downward sloping demand curve) suggests that (assuming all other factors are held constant), if fewer units of a normal good or service are supplied, the individual unit price would be expected to rise. This means that, within the limits of this model and the context of this action, if fewer fish of a given species are harvested fishermen should receive more for each unit of that species they continue to catch and deliver to the market, all else being equal. Any increase in price that would actually occur would depend on, among other things, how responsive the price consumers are willing to pay is to changes in the quantity of catch supplied. The consumers' willingness to pay more for these products is dependent upon how unique the products are, that is, whether the consumer can substitute a lower cost alternative product. There is evidence to support the idea that reduced pollock production would tend to push prices up. The prices shown in this analysis reveal an upward trend in the past several years as pollock TACs have declined from roughly 1.4 million metric tons to approximately 800,000 metric tons. However, very little empirical information is available at this time concerning the responsiveness of price to quantity supplied for the species and product forms potentially affected by the alternatives over the range of possible quantity change that might be anticipated.

To the extent that these pollock fishery products are consumed in the United States, any producer benefit accruing from a price response to diminished supply would be, to a very large extent, offset by a reduction in consumer welfare from the increase in price. That is, the benefit to the industry would simply be the result of a transfer from consumers. Thus, under these conditions, this hypothesized supply-induced price increase would create no net benefits to Americans that could be revealed in a cost-benefit analysis for domestically consumed fish. Quantity changes under some alternatives under consideration in this action may be small enough to have no perceptible impact on prices, while under other alternatives they may. It is not possible, at this time, to estimate the likelihood or magnitude of these hypothetical supply and price effects.

Alternatively, to the extent that these fish are exported and consumed outside of the United States, any supply-induced price increase would create an attributable net benefit improvement to the Nation, from a cost/benefit perspective. This is because the price increase would accrue, in the form of increased gross revenues, to United States producers, while the loss in consumer welfare would be imposed on citizens of other countries. Under OMB guidelines, costs incurred by (and, for that matter, benefits accruing to) foreign producers and consumers are excluded from the net benefit analysis performed in a Regulatory Impact Analysis. Such changes would (all else equal) have no effect on net benefits to the nation.

6.1.6 Costs to Consumers

Ultimately, fish are harvested, processed, and delivered to market because consumers place a value on the fish that is over and above what they have to pay to buy them. A person who buys something would often have been willing to pay more than they actually did for the good. The difference between what they would have been willing to pay and what they had to pay is treated, by economists, as an approximation of the value of the good or service to consumers (i.e., consumer's surplus) and as one component of its social value. If the price of the good rises, the size of this benefit will be reduced, all else equal. If the amount of the good available for consumption is reduced, the size of this benefit is also reduced. Provisions of the proposed non-Chinook salmon PSC minimization actions could reduce the

value consumers of seafood (and associated fish products) receive from the fisheries for several reasons, including 1) consumers may be supplied fewer fish products; 2) consumers may have to pay a higher price for the products they do consume; and 3) the quality of fish supplied by the fishing industry may be reduced and, thus, the value consumers place on (and receive from) them will decline.

The domestic consumer losses would fall into two parts. One part, corresponding to the loss of benefits from fish products that are no longer produced, would be a total loss to society. This is often referred to as a deadweight loss. 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 gross 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 gross revenues.

The actual loss to society cannot be measured with current information about the fisheries. Estimation would require better empirical information about domestic consumption of the different fish species and products, and information about the responsiveness of consumers to the reduction in the supply (e.g., their willingness and ability to substitute other available sources of protein). In addition in the present case, because, under the status quo, society is already in a suboptimal state (i.e., incurring a welfare loss associated with the economic negative externalities imposed by salmon PSC), actions taken to reduce these externality impacts (i.e., minimizing pollock trawl fishing impacts on salmon) will result in an aggregate welfare improvement to society, offsetting any apparent welfare reduction in the retail/wholesale domestic seafood/fish products commercial marketplace (i.e., no deadweight loss is incurred).

6.1.7 Impacts on Related Fisheries

Direct changes to a fishery, induced by non-Chinook salmon PSC minimization measures, could have indirect and unanticipated impacts on other fisheries beyond the gear conflict issue addressed earlier. Some of these impacts could impose (perhaps substantial) costs on these other fisheries. The following costs have been considered in this RIR:

- Displacing capacity and effort,
- Compression/overlapping of fishing season, and
- Increased costs of gearing up and standing down.

Displacing Capacity and Effort: While AFA sideboard provisions and license limitation program constraints seek to manage and control transfer of effort and capacity across fisheries they are not absolute barriers to this phenomenon. Should salmon PSC minimization measures become too constraining to support existing levels of effort, it is possible that effectively displaced capacity would redistribute to remaining open target fisheries within the limits imposed by AFA sideboards, imposing potentially increased costs on the operations that currently prosecute them.

Compression/Overlapping of Fishing Season: Many of the larger operations in the Bering Sea pollock fishery are highly specialized (e.g., AFA surimi C/Ps). Many others, however, rely upon diversification (i.e., fishing a sequential series of different target fisheries over the course of the year) to sustain an economically viable operation. Communities have developed around, and invested in facilities and infrastructure to support, these fishery participation patterns. The classic Alaska example has come to be the 58-foot Limit Seiner. This class of commercial fishing vessel was specifically designed to meet the State of Alaska's regulatory limit (i.e., maximum 58 feet LOA) for participation in the salmon seine fishery. Over time, these, as well as many other, small boats have evolved patterns of operation that include participation in fisheries for (among others) crab, halibut, and various combinations of groundfish species.

Because these operations are economically dependent on participation in a suite of fisheries, anything that alters their ability to move sequentially from fishery opening to fishery opening places them at economic risk. For example, should the Council select a non-Chinook salmon PSC minimization action that results in temporal displacement of fisheries (either directly or indirectly), placing fishery openings in conflict, it could reduce the economic viability of some fishing operations. They could find themselves in the position of choosing to participate in only one fishery, among two or more alternative openings, and foregoing participation in the others. It may not be possible, under these circumstances, for such an operation to remain economically viable in the long run. Besides losing the gross revenues from participation in fisheries that overlap, these operations could find themselves idled during portions of the year when weather and sea conditions would otherwise permit fishing operations. This could have unintended consequences, such as difficulty retaining a professional crew and smaller gross revenues over which to spread fixed costs. It could also mean lost wages to the community.

There could be an analogous concern about the inshore processing sector. Processing plants often are equally dependent on the predictable sequential prosecution of fisheries during their operating year. Many plants in Alaska are specifically designed and configured to take advantage of efficiencies attributable to a consistent seasonal sequence of species delivered for processing. Crews are hired, maintained, or let go, as needed, based on expected demand for processing services. Likewise, start-up, maintenance, and shut-down costs are predicated on the timing and duration of fishery openings, as are logistical and staging costs to assure production inputs are in place when needed, and outputs reach markets on time.

In the worst case scenarios considered in this RIR, owners of processing capacity could be forced to consider not opening their plants because of uncertainty about the timing and duration of fisheries. If some plants fail to open on schedule, fishermen who otherwise would have participated in a fishery may have no market for their catch. This may be particularly significant for small catcher boats operating in relatively remote areas of the state. Furthermore, these effects need not necessarily accrue only to operators in the pollock fishery. In some areas, processors are able to provide markets for, say, salmon, only because they can underwrite some of their fixed staging costs by keeping their operations employed over an extended season with deliveries of crab, halibut, groundfish, etc. The extent to which these potential adverse effects are actually realized cannot be assessed at this time. Nonetheless, they represent potentially significant sources of economic disruption for these sectors of the industry, and the coastal communities that are dependent upon them.

<u>Increased Costs of Gearing Up and Standing Down</u>: Logistical and staging costs can represent a significant expense for many operations participating in the fisheries of the Bering Sea. Should one or more of the non-Chinook salmon PSC minimization measures result in temporal displacement of fisheries there would be adverse economic and operational impacts on vessels, plants, and crews that could not be readily avoided or compensated for. That is, if a salmon PSC minimization measure results in, for example, an early fishery shutdown due to attainment of a hard cap, the immediate result would be an idling of the fleet and associated processing plant capacity. In effect, the fishery would be required to stand-down until the next scheduled seasonal opening. From the perspective of the fishing industry, mandatory idle periods between openings impose direct costs. The longer the duration of imposed idleness and the more numerous these periods, the greater the potential economic and operational burden.

Presumably, there exists some form of a step function that characterizes these potential adverse impacts. That is, it may be likely that a mandatory stand-down of 24 hours, or 48 hours, or even 72 hours, would impose costs that could be absorbed by most operators participating in the target fishery (although all would likely prefer to avoid them). Indeed, over such a relatively brief interval, an operator might keep the crew productively employed with maintenance and/or other forms of preparation for the anticipated re-opening. Nonetheless, the plant or vessel must continue to pay its variable costs (e.g., wages and

salaries, food and housing expenses, fuel and other consumable input costs, etc.) during the stand-down while producing no marketable output, and therefore earning no gross revenues.

Under such circumstances, each operator could eventually reach a threshold, beyond which the cost of standing-by would become a significant economic burden. Precisely where this threshold lies would likely vary by operation. At present, no empirical information is available with which to predict when these thresholds might be attained by any given plant or vessel. However, if the threshold were reached, the operator would face a series of decisions with potentially significant economic costs and operational consequences.

These costs may be characterized as staging expenses. For example, transporting crews by air to and from remote Alaska locations multiple times in a fishing year (rather than once or twice, as has historically been required) would represent a significant additional operating expense. In association with analysis of the Bering Sea Pollock/Steller RPA analysis undertaken in late 1999 and early 2000, the At-sea Processors Association reported that each C/P that participates in the pollock target fishery carries a crew of 100 to 125. Motherships and inshore plants in that same fishery have at least as many transient employees. Repeated movement of crew to and from staging areas in remote Alaska ports in response to stand-down periods, on the scale suggested by these estimates, would represent a potentially significant economic and logistical burden for these fleets and plants.

Similarly, moving fishing supplies and support materials to and from the vessel's staging port or onshore plant location two or more times each season, as well as providing for secure stand-down status of the vessel or plant and its equipment between openings, could impose considerably higher operating costs, and thus smaller profit margins. Moorage slips, especially for the larger vessels in these fleets, may be in short supply, given the limited physical facilities that currently exist in ports and harbors. If entire fleets must lay-up for weeks or even longer periods between openings, existing moorage facilities could be overwhelmed. Even if adequate space could be found, it is probable that rental/leasing costs for that space would be bid up significantly. In the long run, this induced demand could result in investment in additional port and harbor facilities.

As suggested above, inshore processors may experience equivalent logistical costs, depending upon their relative level of operational diversification, geographic location, length of current operating season, etc. Presumably, there exists a balance-point between the minimum necessary volume of deliveries of catch to a plant, the duration of idleness between delivery flows, and the ability to operate a processing facility at all. While likely varying from plant to plant, operator to operator, and even species to species delivered, it is clear that if a plant cannot cover its variable operating costs, it is better off (from an economic perspective) to cease operation altogether. As staging costs (e.g., moving crews and supplies to and from the facility) increase, this operating margin shrinks. Data limitations preclude estimating which plants can or would choose to operate under these circumstances. It is apparent; however, that significant temporal changes in fishery openings and/or duration (as implicitly or explicitly provided for under several of the proposed alternatives) would increase the likelihood that some may not continue to operate.

6.2 The Rolling Hotspot System Under Alternative 1: Status Quo

An examination and analysis of the effectiveness of the rolling hotspot system (RHS), under the status quo, has been conducted by Dr. Alan Haynie, of the Alaska Fisheries Science Center. The analysis, in its entirety, is contained in Chapter 5 of the accompanying EA and is the most comprehensive treatment of the efficacy of the RHS conducted to date. While all of the analysis is highly pertinent in the evaluation of the status quo, and in comparing the potential effects of Alternatives 2 and 4 with the status quo, the analysts have chosen to limit the treatment here to the summary of findings of that analysis. It should be understood; however, that the full treatment of that analysis is applicable here and is hereby incorporated both by the association of the EA and RIR as accompanying documents and by reference.

Summary of Findings on Status Quo Chum PSC-reduction measures

Collectively, the Chinook and chum salmon PSC measures implemented through the RHS system and Amendment 91 arguably represent the most extensive PSC reduction efforts that have been undertaken. In this analysis, we concentrate on the RHS components of the chum PSC reduction measures. A number of relevant findings are summarized below.

Key findings of the status quo current-period and historical analysis include:

- Chum PSC has been reduced by the chum RHS program. Looking at the change in rates following the RHS closures, the reduction is several percent, but this number is larger after controlling for vessel and closure-specific effects. The reduction in chum PSC is also larger in the June-August period than in the B-season as a whole. However, in 2011, there was not an observable average chum PSC reduction from the RHS program.
- From 2003-2011, chum PSC rates for the entire B-season in the 1-3 days following RHS closures are approximately 9 percent lower than in the 1-3 days before, after controlling for vessel- and closure-specific variation. For June-August, this average PSC reduction was 15 percent.
- Evaluating the 1993-2000 period, an RHS-like system would have reduced chum PSC by an estimated 9-22 percent on average with about 4-10% percent of pollock fishing have been relocated to other areas.
- The current period RHS analysis provides an estimate of the impact soon after the closures, but it does not account for some reduction that may occur when closures are left in place for a long period of time. However, closures are typically left in for long periods in times of relatively low chum PSC, so the majority of chum typically occurs in periods when closures are moved to address new hotspots. Further, the reduction farther away from the closures is likely to be less substantial, as the closures will usually have less impact on fishing choices as the fleet readjusts. So it is reasonable in light of these analyses, including the historical simulations, to estimate that the total chum PSC reduction to be in the range of 10-15 percent.
- Annual average share of chum PSC *caught in the* closures in the 5-days before closures were imposed from 2003-2011 ranged from 11-36 percent for CVs and from 2-32 percent for other sectors, with the majority of years being in the upper end of this range for CVs. The average percentage of pollock range caught in the closures areas during this period ranged from 7-21 percent for CVs and was 6 percent or less for the other sectors.
- The pre-RHS analysis suggest that often ‘what’s good for chum is good for Chinook’ with the range of Chinook PSC savings as 6-14 percent per year when areas are closed because of high chum rates only.
- Based on 1993-2000 data, increasing the number of closures always reduces salmon PSC more, but at the cost of reallocating additional pollock effort per unit of PSC avoided.
- Closures based on the most recent information possible lead to larger average reductions and moderately small base rates appear on average to be more effective. At a very low PSC level, closures do not appear to be effective.

- The current "tier system" of the RHS program allows cooperatives with low PSC relative to the base rate to fish inside closed areas. This could provide some incentive for cooperatives to have lower chum PSC rates in order to be able to fish in closed areas, though these vessels often choose to fish elsewhere regardless of tier status. *During closure periods, 4.6 percent of CV pollock and 0.3 percent of pollock by the other sectors was taken inside the closure areas.* Thus there is little evidence that the incentives within the current tier system are likely to provide strong motivation for chum PSC reduction.
- An examination of the chum PSC rates in the chum Salmon Savings Area (SSA) indicates that in over 90 percent of months from 2003-2010, chum PSC rates were *lower* in the Chum SSA than outside of it, suggesting that a trigger closure of this area could be actually increase chum PSC.
- An evaluation of the B-season Chinook Conservation Area (BCCA) which is imposed by the CP/MS/CDQ incentive plan agreement (IPA) suggests that there is little evidence to suggest the BCCA is likely to have a significant impact on chum PSC rates.
- In 2011, chum RHS closures were in place throughout the B season, whereas in previous years Chinook closures were explicitly given regulatory priority. Additionally, in 2011 all vessels had 100 percent coverage and salmon was censused in the plant. This did not lead to greater chum reduction.
- As well as changing Chinook-avoidance incentives, Amendment 91 also changes the incentive to avoid Chinook *relative* to chum – vessels do not pay an individual cost of chum, but do for Chinook – therefore vessels will be likely to choose to fish in high chum grounds with zero Chinook over low chum grounds with any Chinook in them.

Compared to alternative spatial management systems, the RHS system has advantages and limitations. Key advantages of the hotspot system relative to fixed closures include:

- Sea State has shown the ability to make trade-offs between chum and Chinook PSC and to consider how vessels will respond.
- Adjustments to what areas will be closed can be made regularly in response to the substantial inter-annual variability in the quantity and concentration of PSC. This prevents the possibility that fixed closures would consistently force vessels from low-PSC areas, which is a possibility with any system that cannot adjust.
- Anecdotal information from vessel operators and plant managers can be combined with observer data, VMS data, and knowledge of how seasonal PSC conditions evolve to make well-informed predictions of where salmon PSC will occur in the near-term. For example, from the 8/27/07 SeaState report – "It would be particularly useful to know if there is a temperature front associated with higher or lower PSC, as there was further up on the shelf."
- In balancing the chum and Chinook PSC, the RHS system has demonstrated the ability to carefully balance the trade-offs in a manner that could not be done with fixed closures.

6.3 Pollock Fishery Gross Revenue under Alternative 1: Status Quo

The analysis of potential effects on pollock industry gross revenue uses a retrospective analysis of fishery conditions during the 2004 through 2011 seasons. Constraints, in the form of fishery closures, are applied in each year, by season and sectors. Thus, the constraints are applied to calculate potentially forgone gross revenue as that portion of revenue that was actually earned, as reported by industry, up to the date of the closure. The actual total first wholesale gross revenue values that the industry earned during the 2003-2011 time-frame (i.e. under Alternative 1, the status quo) are presented below. Their use in calculating prices used in the impact analysis is detailed in the next section.

Table 6-1 A and B Season total (Annual) Round weight equivalent nominal first wholesale gross value of retained pollock by sector 2004–2011.

YEAR	A and B Season Annual Total First Wholesale Gross Value			Total Annual First Wholesale Value
	CDQ	CP/M	Shoreside	
2004	$116	$520	$446	$1,082
2005	$131	$597	$536	$1,264
2006	$133	$597	$517	$1,247
2007	$139	$602	$500	$1,241
2008	$145	$647	$540	$1,331
2009	$109	$472	$446	$1,027
2010	$106	$491	$438	$1,035
2011	$124	$589	$536	$1,248

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2008 through 2012.

Harvest tonnages were valued using annual round weight equivalent first wholesale prices derived from the catch accounting system (Hiatt 2011). The first wholesale prices were estimated by dividing the total wholesale value of pollock production by estimated retained tons of pollock, to yield a round weight per ton of catch equivalent value. First wholesale prices are the prices received by the first level of inshore processors, or by catcher-processors and motherships. They reflect the value added by the initial processor of the raw catch. They are not, therefore, equivalent to ex-vessel prices. The first wholesale values by species group, fishing gear, and area for the catcher-processor fleet used in this analysis are summarized in the tables below.

6.4 Calculation of Potentially Forgone Pollock Revenue and Pollock Revenue at Risk

The analysis of potential forgone gross revenue has used the estimated date on which the pollock fishery would have hit the various non-Chinook salmon PSC caps in each of the years 2003-2011 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 gross 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 and is processed both at sea (on 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. 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 lie outside this level of valuation. Further, potential welfare impacts in domestic markets cannot be determined with available data. Thus, first wholesale value is an appropriate value by which to capture the total quantifiable domestic market effect on potential forgone pollock harvest and gross 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 gross revenue at the first wholesale level. This is done annually from 2003 through 2011 in the RIR for each of the sectors and these prices are reported in Table 6-2 and Table 6-3. These are the prices that are applied by year for each year from 2003 through 2011.

Table 6-2 B Season Round weight equivalent nominal first wholesale value of retained pollock by sector, 2004-2011 ($/mt).

YEAR	Round Weight Equivalent First Wholesale Value/mt		
	CDQ	CP/M	Shoreside
2003	$538	$540	$633
2004	$565	$559	$596
2005	$688	$712	$700
2006	$705	$713	$698
2007	$834	$818	$763
2008	$1,233	$1,249	$1,114
2009	$1,153	$1,122	$1,189
2010	$1,185	$1,236	$1,178
2011	$1,058	$1,104	$1,032

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 20109. * 2010 price is used to proxy 2011 prices.

Table 6-3 B Season nominal first wholesale value of retained pollock by sector 2004–2011.

YEAR	B Season First Wholesale Gross Value			Total B Season First Wholesale Value
	CDQ	CP/M	Shoreside	
2003	$49	$218	$249	$515
2004	$51	$221	$225	$498
2005	$63	$283	$274	$619
2006	$64	$288	$268	$620
2007	$70	$303	$251	$624
2008	$75	$337	$283	$695
2009	$57	$248	$249	$554
2010	$59	$278	$249	$585
2011	$54	$349	$309	$711

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2008 through 2012.

The analysis of gross revenue impacts of the alternatives on the pollock industry was conducted in terms of two gross revenue categories. The first is the potential forgone gross revenues that could have been generated under various non-Chinook salmon PSC hard caps contained within Alternative 2. This is simply the gross revenue that would have been generated by the pollock TACs, and their allocations among sectors, that have historically been caught after the projected closure date under the hard cap scenarios. These differ between the alternatives depending upon the sector, cap amount, seasonal split options, and historic allocation options.

The second general category is gross revenues at risk under the triggered closure area options contained in Alternative 3. The affected fishing fleets may or may not have been able to make up the displaced catch and the gross revenues that would have been lost because of these restrictions, by fishing outside of the closure area. Because some sectors may potentially have been able to recover some or all of these gross revenues, the gross income from these catches cannot, strictly speaking, be described as lost. Instead, they have been described here as "at risk."

Only if it is assumed that harvest foreclosed to a fleet sector in one area by Alternative 3 could not have been made up elsewhere by that fleet sector would at-risk gross revenues be an estimate of lost gross revenues. Accurate estimates of the abilities of fleets to make up a reduction in harvests in one area, due to closures under Alternative 3, by fishing in another require information on the following: (1) the volume of catch (and resulting production) affected by the Alternative 3 closure areas, (2) the extent to which each fleet sector would have redirected its operations into other fishing areas, and (3) the comparative productivity of the fleet sectors in the new areas. Currently, it is possible to quantitatively estimate only the first of these, (i.e., the volume of catch coming from areas that would no longer have been available to fishermen under each triggered closure scenario contained within Alternative 3.

As noted above, gross revenues at risk are forgone **only** if a fishing fleet is unable to modify its operation to accommodate the imposed limits and, thus, cannot make up displaced catches elsewhere (either in remaining open fishing areas or during alternative open fishing periods). Having estimated the maximum gross revenues that might be lost to each sector, on the assumption that the fleet is unable to make up the affected harvests, it is possible to incrementally relax this assumption and assess the effects. If one assumes that the underlying behavioral model is linear in its parameters, evaluating an alternative assumption about the total forgone catch is straightforward. For example, if one assumes that a given sector is able to make up 10 percent of the harvest elsewhere, the estimated at risk gross revenue impact would be multiplied by 0.90; if the assumption is that, say, 20 percent is made up elsewhere, the total is multiplied by a factor of 0.80, and so forth. This is done without specifying where (or when) the sector might operate, or at what cost. With total gross revenue at risk information available for each fleet segment, the reader may apply his or her own assumptions about the extent to which each fleet segment would be able to make up its catch elsewhere, thus producing his or her own estimates of the gross revenues that might be forgone.

6.5 Potentially Forgone Gross Revenue and "Revenue at Risk" under Alternative 2

Under the non-Chinook salmon PSC hard cap scenarios included in Alternative 2, option 1a, the pollock trawl fishery, and/or specific sectors that participate in it (depending on apportionments of hard caps) would be required to stop fishing once a specific hard cap is reached. In such a circumstance, any remaining TAC that is not harvested when the cap is reached would remain unharvested unless specific provisions of the hard cap alternative dealing with transfers, rollovers, and/or cooperative level

management are applied. These may in mitigate potential losses in gross revenue due to unharvested pollock TAC.

While the hard cap option of Alternative 2 has the potential effect of fishery closure and resulting forgone pollock fishery gross revenue, option 1b would close the fishery in June and July and reopen it in August. The fleet would be required to stand down during this closure and would, presumably, then return to the grounds and attempt to harvest all remaining pollock allocation in the remainder of the B season. Thus, option 1b is essentially a triggered closure of the Bering Sea pollock fishery that puts the gross revenue earned historically in June and July at risk of not being realized. The gross revenue associated historically with June and July harvests is placed at risk of not being earned if the fishing post closure is not sufficiently productive to offset any operational costs increases, opportunity costs associated with switching to another fishery (e.g. Pacific whiting) , associated with relative harvesting inefficiencies post closure, and provided that the fleet feels that is able to sufficiently avoid Chinook salmon PSC late in the B season such that Chinook PSC will not affect future constraints on the pollock fishery under the Chinook salmon PSC management measures of Amendment 91. The previous discussion contained in the overview of costs and benefits provides a treatment of some of the implications and limitations of this "revenue at risk" analysis.

This section specifically details the impacts on gross revenue and gross revenue put at risk via an unmitigated closure of the pollock fishery, or sectors within it, due to hard caps under option 1a. This analysis provides hypothetical estimates of potentially forgone pollock first wholesale gross revenue by year and season under non-Chinook PSC option for fleet wide caps, and for the CDQ fishery and non-CDQ fishery. Also provided are estimates of gross revenue put at risk, with similar sector level breakouts, by option 1b of Alternative 2.

Table 6-4 provides hypothetical estimates of potentially forgone pollock first wholesale gross revenue, by year and season, under the options for fleet wide caps, and for the CDQ fishery and the non-CDQ fishery. As expected, the greatest adverse economic impact would have occurred in the highest PSC year (2005, and 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon where scenario 1 estimates are approximately $481 million would potentially have been forgone. That gross value is composed of $210 million from the CV sector, $206 million from the CP sector, $49 million from the Mothership sector, and $68 million from CDQ pollock fisheries. The 2011 potentially forgone gross value of $516 million is composed of $207 million from the CV sector, $220 million from the CP sector, $69 million from the Mothership sector, and $20 million from CDQ pollock fisheries.

As is expected, as the hard cap amount increases, the adverse economic impacts on the pollock fisheries decrease, all else being equal. As the hard cap level is increased to 200,000 fish the potentially forgone gross revenue estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that as the cap in increased the potentially forgone gross revenue accrues mostly, and in some cases only, in the CV sector. As the hard cap level is increased to 353,000 fish, and the allocation scenarios go from 2ii to 4ii and to 6, the potentially forgone revenue estimates continue to decline relative to the two lower caps and the impacts accrue exclusively in the CV sector (353,000 cap, allocation 3, $176 million in 2005), and As is the case of the 200,000 fish cap, this is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

Table 6-4 Alternative 2, Option 1a: Estimated hypothetical forgone pollock nominal gross revenue ($ millions) in the B season by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$36	$171	$35	$118	$360	$9	$106	$8	$44	$167		$70		$21	$91
2005	$16	$206	$49	$210	$481	$4	$76	$15	$175	$271		$52	$3	$148	$202
2006		$162		$248	$410				$164	$164					
2007	$15	$92	$23	$60	$190										
2008															
2009															
2010															
2011	$20	$220	$69	$207	$516		$102	$56		$158		$7	$26		$33
4ii (sector allocation 2)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$20	$160	$28	$119	$328		$70	$1	$47	$118		$4		$36	$40
2005	$13	$95	$47	$212	$367		$45	$6	$181	$232				$157	$157
2006		$69		$251	$320				$203	$203				$139	$139
2007	$12	$55	$18	$70	$156										
2008															
2009				$21	$21										
2010															
2011	$8	$162	$66	$216	$453			$30		$30			$13		$13
6 (sector allocation 3)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$13	$127	$23	$121	$285		$28		$86	$114				$45	$45
2005	$10	$85	$45	$216	$355				$187	$187				$176	$176
2006				$253	$253				$223	$223				$168	$168
2007		$43	$14	$90	$147										
2008															
2009				$73	$73										
2010															
2011	$2	$145	$63	$269	$480			$19	$69	$88					

The following tables provide the data, discussed above, by sector (CDQ, CP, CV, and motherships) as a percent of B season total gross revenue and then as a percent of annual total gross revenue. What is immediately obvious is that potentially forgone gross revenue in the CV sector can represent more than 92% of B season total gross revenue in the worst case under the 50,000 fish cap. Also evident it that CPs can also have as much as 77% and the CDQ sector as much as 70 % of their B season gross revenue placed at risk under the lowest cap, while motherships have relatively lower percentages of less than 20 percent of B season gross revenue placed at risk. As is the case with gross revenue estimates, percent of revenue show increasing impacts to CVs, under the scenario 2 and 3, with reductions is other sectors, while the effect of increasing the cap is to concentrate impacts , albeit at reduced levels due to the larger cap, within the CV sector under scenario 2 and 3. If these impacts are considered as a percent of annual total instead of B season gross revenue one sees that the percentage impacts fall by roughly half of their value but remain fairly high.

Table 6-5 Alternative 2, Option 1a: Estimated hypothetical forgone pollock nominal gross revenue, as a percent of B season total gross revenue, by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	70.0%	77.4%	15.6%	52.5%	72.3%	18.2%	47.8%	3.4%	19.6%	33.6%		31.6%		9.2%	18.2%
2005	25.8%	72.7%	17.1%	76.8%	77.6%	6.2%	27.0%	5.3%	64.2%	43.7%		18.2%	1.1%	53.9%	32.7%
2006		56.3%		92.4%	66.1%				61.3%	26.5%					
2007	20.9%	30.3%	7.7%	24.1%	30.5%										
2008															
2009															
2010															
2011	37.8%	63.2%	19.9%	67.0%	72.6%		29.2%	16.0%		22.2%		2.1%	7.5%		4.7%
4ii (sector allocation 2)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	39.9%	72.3%	12.7%	52.8%	65.8%		31.6%	0.4%	21.1%	23.8%		1.9%		15.8%	8.0%
2005	20.9%	33.5%	16.7%	77.6%	59.3%		16.0%	2.1%	66.1%	37.5%				57.5%	25.4%
2006		24.2%		93.5%	51.7%				75.6%	32.7%				51.8%	22.4%
2007	17.2%	18.3%	6.0%	28.1%	25.0%										
2008															
2009				8.3%	3.7%										
2010															
2011	15.5%	46.6%	19.0%	69.8%	63.6%			8.5%		4.2%			3.7%		1.8%
6 (sector allocation 3)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	25.9%	57.4%	10.5%	53.7%	57.2%		12.8%		38.1%	23.0%				20.1%	9.1%
2005	15.2%	30.0%	16.0%	78.8%	57.4%				68.3%	30.2%				64.5%	28.5%
2006				94.2%	40.8%				83.2%	36.0%				62.5%	27.1%
2007		14.3%	4.5%	35.9%	23.5%										
2008															
2009				29.4%	13.2%										
2010															
2011	4.6%	41.7%	18.1%	87.0%	67.5%			5.4%	22.5%	12.4%					

Table 6-6 Alternative 2, Option 1a: Estimated hypothetical forgone pollock nominal gross revenue, as a percent of Annual total gross revenue (A and B season combined), by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	30.8%	33.0%	6.6%	26.5%	33.3%	8.0%	20.4%	1.5%	9.9%	15.4%		13.5%		4.7%	8.4%
2005	12.3%	34.5%	8.1%	39.2%	38.0%	3.0%	12.8%	2.5%	32.7%	21.4%		8.6%	0.5%	27.5%	16.0%
2006		27.1%		47.9%	32.9%				31.8%	13.2%					
2007	10.6%	15.3%	3.9%	12.1%	15.3%										
2008															
2009															
2010															
2011	16.4%	37.4%	11.8%	38.6%	41.4%		17.3%	9.5%		12.6%		1.2%	4.4%		2.7%
4ii (sector allocation 2)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	17.6%	30.8%	5.4%	26.7%	30.3%		13.5%	0.2%	10.6%	10.9%		0.8%		8.0%	3.7%
2005	10.0%	15.9%	7.9%	39.6%	29.0%		7.6%	1.0%	33.8%	18.4%				29.3%	12.4%
2006		11.6%		48.5%	25.7%				39.2%	16.3%				26.9%	11.1%
2007	8.7%	9.2%	3.0%	14.1%	12.6%										
2008															
2009				4.6%	2.0%										
2010															
2011	6.7%	27.6%	11.3%	40.3%	36.3%			5.1%		2.4%			2.2%		1.0%
6 (sector allocation 3)															
Cap:			**50,000**					**200,000**					**353,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	11.4%	24.4%	4.5%	27.1%	26.3%		5.5%		19.2%	10.6%				10.1%	4.2%
2005	7.3%	14.2%	7.6%	40.2%	28.1%				34.9%	14.8%				32.9%	13.9%
2006				48.9%	20.3%				43.2%	17.9%				32.4%	13.5%
2007		7.2%	2.3%	18.0%	11.8%										
2008															
2009				16.4%	7.1%										
2010															
2011	2.0%	24.7%	10.7%	50.2%	38.4%			3.2%	13.0%	7.1%					

The effects of Alternative 2, option 1b (June and July closure option), in the highest PSC years and under the most restrictive PSC cap of 15,600 non-Chinook salmon are estimated to be approximately $201 million and $311 million in gross revenue at risk in 2005 and 2011, respectively. The 2005 gross revenue at risk is composed of $88 million from the CV sector, $87 million from the CP sector, and $27 million from the Mothership sector. The 2011 gross revenue at risk is composed of $148 million from the CV sector, $99 million from the CP sector, $33 million from the Mothership sector, and $31 million from the CDQ pollock fisheries. The changes in impacts as the cap increases and the allocation is changed are similar to those identified for option 1a; however, option 1b results in considerably reduced potential impacts on the pollock fishery when compared to option 1a.

Table 6-7 Alternative 2, Option 1b: Estimated hypothetical pollock nominal gross revenue ($ millions) at risk in the B season by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$101	$13	$1	$115		$95	$2		$97		$84			$84
2005		$87	$27	$88	$201		$43	$24	$63	$130			$21	$46	$67
2006		$57		$89	$146		$4		$73	$77				$58	$58
2007		$28	$7		$35										
2008															
2009			$22	$25	$47										
2010			$9		$9										
2011	$31	$99	$33	$148	$311		$68	$32	$40	$139		$12	$26		$39
4ii (sector allocation 2)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$99	$12	$10	$121		$77			$77		$27			$27
2005		$81	$26	$91	$198			$22	$69	$91				$56	$56
2006		$28		$90	$118				$83	$83				$63	$63
2007			$3		$3										
2008															
2009			$11	$44	$55										
2010															
2011	$11	$89	$33	$150	$283		$12	$27	$74	$112			$23		$23
6 (sector allocation 3)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$97	$10	$23	$131		$32			$32					
2005		$79	$26	$96	$200			$14	$72	$86				$64	$64
2006		$11		$92	$103				$86	$86				$78	$78
2007				$8	$8										
2008															
2009				$65	$65										
2010															
2011		$75	$33	$154	$262			$24	$107	$131			$12	$41	$53

The following tables provide the data, discussed above, by sector (CDQ, CP, CV, and motherships) as a percent of B season total gross revenue and then as a percent of annual total gross revenue. Potentially forgone gross revenue in the CV sector can represent nearly 48% of B season total revenue in the worst case under the 15,600 fish cap. Also evident it that CPs can also have as much as 45% and the CDQ sector as much as 57 % of their B season gross revenue placed at risk under the lowest cap, while motherships have relatively lower percentages of less than 10% of B season gross revenue placed at risk. As is the case with gross revenue estimates for option 1b, percent of gross revenue show increases in impacts to CVs, under the scenario 2 and 3, with reductions is other sectors, while the effect of increasing the cap is to concentrate impacts , albeit at reduced levels due to the larger cap, within the CV sector under scenario 2 and 3. If these impacts are considered as a percent of annual total instead of B season gross revenue one sees that the percentage impacts fall by roughly half of their value but remain fairly high.

Table 6-8 Alternative 2, Option 1b: Estimated hypothetical pollock nominal gross revenue at risk, as a percent of B season total gross revenue, by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		45.6%	5.8%	0.6%	23.1%		42.9%	1.0%		19.6%		37.9%			16.9%
2005		30.6%	9.4%	32.2%	32.5%		15.1%	8.4%	23.2%	21.0%			7.5%	16.7%	10.8%
2006		19.8%		33.1%	23.5%		1.5%		27.1%	12.4%				21.6%	9.4%
2007		9.1%	2.4%		5.6%										
2008															
2009			8.9%	10.0%	8.5%										
2010			3.2%		1.5%										
2011	57.0%	28.4%	9.6%	47.8%	43.7%		19.4%	9.1%	12.9%	19.6%		3.6%	7.5%		5.4%
4ii (sector allocation 2)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		44.5%	5.3%	4.6%	24.2%		34.8%			15.5%		12.1%			5.4%
2005		28.5%	9.3%	33.4%	32.0%			7.8%	25.4%	14.8%				20.6%	9.1%
2006		9.9%		33.4%	19.0%				30.9%	13.4%				23.6%	10.2%
2007			0.8%		0.4%										
2008															
2009			4.5%	17.5%	9.9%										
2010															
2011	19.8%	25.6%	9.5%	48.7%	39.8%		3.3%	7.7%	23.9%	15.8%			6.6%		3.2%
6 (sector allocation 3)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		43.9%	4.7%	10.2%	26.2%		14.3%			6.3%					
2005		27.8%	9.0%	35.0%	32.3%			4.9%	26.4%	13.9%				23.5%	10.4%
2006		3.9%		34.3%	16.7%				32.2%	13.9%				28.9%	12.5%
2007				3.1%	1.2%										
2008															
2009				26.0%	11.7%										
2010															
2011		21.4%	9.5%	49.8%	36.8%			6.9%	34.7%	18.5%			3.3%	13.4%	7.5%

Table 6-9 Alternative 2, Option 1b: Estimated hypothetical pollock nominal gross revenue at risk, as a percent of Annual total gross revenue (A and B season combined), by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		19.4%	2.5%	0.3%	10.6%		18.3%	0.4%		9.0%		16.1%			7.8%
2005		14.5%	4.4%	16.4%	15.9%		7.2%	4.0%	11.8%	10.3%			3.6%	8.5%	5.3%
2006		9.5%		17.2%	11.7%		0.7%		14.0%	6.2%				11.2%	4.7%
2007		4.6%	1.2%		2.8%										
2008															
2009			4.7%	5.6%	4.6%										
2010			1.8%		0.8%										
2011	24.7%	16.8%	5.7%	27.5%	24.9%		11.5%	5.4%	7.4%	11.1%		2.1%	4.4%		3.1%
4ii (sector allocation 2)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		19.0%	2.2%	2.3%	11.2%		14.8%			7.1%		5.2%			2.5%
2005		13.5%	4.4%	17.1%	15.7%			3.7%	13.0%	7.2%				10.5%	4.5%
2006		4.7%		17.3%	9.5%				16.1%	6.7%				12.3%	5.1%
2007			0.4%		0.2%										
2008															
2009			2.4%	9.8%	5.3%										
2010															
2011	8.6%	15.1%	5.7%	28.1%	22.7%		2.0%	4.6%	13.8%	9.0%			3.9%		1.8%
6 (sector allocation 3)															
Cap:			**15,600**					**62,400**					**110,136**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		18.7%	2.0%	5.2%	12.1%		6.1%			2.9%					
2005		13.2%	4.3%	17.8%	15.8%			2.3%	13.5%	6.8%				12.0%	5.1%
2006		1.9%		17.8%	8.3%				16.7%	6.9%				15.0%	6.2%
2007				1.6%	0.6%										
2008															
2009				14.5%	6.3%										
2010															
2011		12.7%	5.6%	28.7%	21.0%			4.1%	20.0%	10.5%			2.0%	7.7%	4.2%

6.6 Potential Effects of Alternative 3

Alternative 3 proposes a revised RHS system similar to the one in operation under Alternative 1. While there are key aspects to the program that differ from the status quo RHS system (as described further in Chapter 5 and Appendix 4 of the Accompanying EA) the estimated impacts on the fishery as it relates to pollock catch (and thus the pollock stock) are best approximated by the status quo. RHS closures will move the fishery around spatially and temporally and may do more of that under the Alternative 3 revised program in June and July, while ceasing to do so as Chinook PSC increases later in August into September. Under Alternative 3 (or any of the 4 alternatives) there are no proposed changes to the Chinook bycatch management program in place. The pollock stock is managed based on science covering a wide variety of facets including the capacity of the stock to yield sustainable biomass on a continuing basis. Spatial and temporal distribution changes are closely monitored by scientifically trained at-sea observers. These changes are reflected in the annual stock assessments and in consideration of fishing conditions. Regular diet compositions and applications to multispecies ecosystem models are conducted to evaluate changes in predator-prey dynamics. In general, variability in environmental conditions likely affects stock productivity more than the timing and location of fishing activities. The present bycatch management system in place neither significantly affects the distribution of the stock spatially and temporally, nor is it reasonably expected to jeopardize the capacity of the stock productivity on a continuing basis. Thus Alternative 3 is expected to have an insignificant effect on the productivity of the pollock stock as evidenced by the capacity to yield sustainable biomass on a continuing basis and the ability of the stock to sustain itself regardless of any minor modifications in the stock distribution as a result of the fishery.

6.7 Revenue at Risk under Alternative 4

While the hard cap alternatives have the potential effect of fishery closure and resulting forgone pollock fishery gross revenue, the triggered closures do not directly create forgone gross revenue, but rather, they place gross revenue at risk of being forgone. When the closure is triggered, vessels must be relocated outside the closure areas and operators must attempt to catch their remaining allocation of pollock TAC outside the closure area. Thus, the gross revenue associated with remaining allocation is placed at risk of not being earned if the fishing outside the closure area is not sufficiently productive to offset any operational costs associated with relative harvesting inefficiencies outside the closure area. The previous discussion contained in the overview of costs and benefits provides a treatment of some of the implications and limitations of this “revenue at risk” analysis.

As was the case for forgone gross revenue, the gross revenue at risk estimate is the answer to the question of how much gross revenue they earned, in each of the years 2004-2011, from the projected date of the triggered closure (see EA Chapter 4) through the end of the season. Thus, it is a retrospective assessment of actual gross revenue earned in those years from the projected triggered closure date forward. Presented here are the estimates of gross revenue at risk and the percent of total gross revenue that these estimates comprise.

It is also possible to take a further step with regard to analysis of triggered closure areas (Alternative 4). Having estimated the maximum gross revenues that might be lost by each fleet segment, on the assumption that the fleet is unable to make up reduced harvests by fishing in other areas, it is possible to gradually relax that analytical constraint by assuming the fleet component would have been able to make up some percentage of the gross revenue at risk by fishing in other areas not affected by non-Chinook salmon PSC minimization measures. This is done without specifying where the fleet segment might otherwise have operated (or at what cost), except to assume that the effort would have been redistributed to remaining open areas, during remaining open periods, under existing management regulations. With

this information available for each fleet segment, readers may apply their own assumptions about the extent to which each fleet segment would be able to make up its catch elsewhere, under the differing temporal and geographic constraints and limitations provided across competing non-Chinook salmon PSC minimization alternatives, should these measures be applied to future fishing effort. In this way, individuals may produce their own estimates of the future gross revenues that might be forgone under each alternative.

To be precise, the gross revenues at risk were estimated using information about the following: (1) projected fleet segment harvests for the 2004 through 2011 fishing years assuming the provisions of each non-Chinook salmon PSC minimization alternative had been in place in that year; (2) the actual proportions of harvest of different allocations, by different sectors (e.g. CDQ, CP, CV, Motherships), based upon historical catch patterns in 2003 through 2009; and (3) estimated product mix and first wholesale product values for all pollock products by sector and year from 2004 through 2011.

Component 1 of this alternative sets the trigger PSC cap level for this large scale closure. PSC from all vessels will accrue towards the cap level selected. However if the cap level is reached, the triggered closure would not apply to participants in the RHS program. Under Component 2, however, in addition to the large closure for non-RHS participants, a select triggered area closure would apply to RHS participants. Four options of triggered closure areas and time frames are provided under Component 2. Component 3 then sets the trigger PSC cap level for the area selected under Component 2. Given that, at present, full participation in the RHS is occurring; component 1 is likely to have no effect on the fleet unless an entity drops out of the system. What is analyzed here are Options 1a, 1b, 2a, and 2b, where a triggered closure would apply to participants in the RHS with the level of impact depending on the seasonal timing of June-July (Options 1a and 2a) versus all of the B season (Options 1b, and 2b) and on the size of the closure area being at an 80 percent level (Options 1a and 1b), versus a 60 percent level (Options 2a, and 2b). Chapter 2, of the accompanying EA provides an extensive discussion of how these alternative components and options were developed and also provides a treatment of the management and enforcement implications associated with the various options. A thorough review of EA Chapter 2 is quite necessary in order to contextualize the potential impacts presented here.

Table 6-10 through Table 6-12 provide impact estimates under option 1a in terms of dollars of gross revenue, as a percent of B season total gross revenue, and as a percent of total annual gross revenue by sector. A review of the estimates presented in these tables reveals that shore based CVs would have the vast majority of the gross revenue at risk and the greatest percentages of B season total first wholesale gross revenue at risk as well as annual total gross first wholesale revenue. Under the smallest trigger cap of 25,000 and in allocation scenario 1 the CV sector is estimated to have had as much as $170 million in revenue at risk in2011 out of the $240 million total for all fleet sectors combined. This represents approximately 55 percent of the CV B season total gross revenue and approximately 32 percent of total gross revenue.

As is expected, relaxing the trigger caps has the result of decreasing the gross revenue at risk. The 2011 CV gross revenue at risk (scenario 1), for example, decreases from $170 million to $105 million and to zero as the trigger cap is relaxed to 75,000 and then 200,000. The opposite effect is shown when shifting from allocation scenario 1 to allocation scenario 2 and then allocation scenario 3 with the 2011 CV gross revenue at risk, for example, increasing from $170 million to $172 million, and $176 million.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are relatively small in nearly all years under consideration. There are relatively high impacts to the CDQ sector in 2003 and 2011 at 17.8 percent and 19.4 percent, respectively. However, the CDQ sector has had considerably lower gross revenue at risk in all other years. The Mothership sector had a similar pattern in 2003 and 2011 with 17.8 percent and 19.4 percent or B season gross revenue put at risk, respectively.

These impacts are relatively smaller than the impacts to the CV sector which would have been as much as 55 percent in 2011 and ranged from 24 percent to 47 percent in the years prior to 2008.

When considering gross revenue at risk as a percent of annual total gross revenue the potential impacts appear to be considerably reduced in almost all years, allocation scenarios, and cap levels for all sectors other than the CV sector. Thus, it is not likely that the CDQ, CP, or Mothership sectors will have difficulty mitigating gross revenue at risk under Alternative 4, option 1a. The CV sector, in contrast, bears as much as 30 percent of its gross revenue being placed at risk in several of the years within this retrospective analysis and, therefore, would likely experience costs associated with effort relocation and may not be able to fully mitigate gross revenue at risk.

Table 6-10 Alternative 4, Option 1a: Estimated hypothetical nominal gross revenue at risk ($ millions) due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels for Option 1a, 2004-2011.

2ii (sector allocation 1) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$9	$35	$12	$80	$137	$6	$34	$4	$64	$107	$1	$13	$0	$24	$39
2005	$0	$7	$6	$125	$139	$0	$4	$4	$115	$123		$3		$101	$104
2006		$7	$0	$116	$123		$1		$99	$100				$62	$62
2007	$1	$13	$0	$60	$75	$1	$13	$0		$15					
2008															
2009	$0		$0	$22	$23										
2010															
2011	$10	$27	$33	$170	$240	$7	$27	$31	$105	$170		$21	$23		$44
4ii (sector allocation 2) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$8	$34	$11	$81	$134	$1	$23	$4	$76	$104		$11		$26	$37
2005	$0	$6	$5	$131	$142	$0	$3	$1	$118	$121		$2		$106	$108
2006		$2		$117	$119				$108	$108				$76	$76
2007	$1	$13	$0	$62	$77	$0	$13		$39	$52					
2008															
2009			$0	$23	$23										
2010															
2011	$8	$27	$33	$172	$240	$2	$23	$26	$128	$179			$19		$19
6 (sector allocation 3) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$5	$34	$8	$88	$134	$0	$12	$0	$79	$92		$7		$57	$64
2005	$0	$4	$4	$140	$148		$3		$121	$124				$110	$110
2006		$1		$118	$119				$114	$114				$93	$93
2007	$1	$13	$0	$68	$83				$51	$51					
2008				$11	$11										
2009				$26	$26				$11	$11					
2010															
2011	$7	$27	$32	$176	$242		$19	$23	$136	$178			$15	$62	$76

Table 6-11 Alternative 4, Option 1a: Estimated hypothetical B season nominal gross revenue at risk, as a percent of B season total gross revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 1a, 2004-2011.

2ii (sector allocation 1) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	17.8%	15.8%	5.6%	35.6%	27.5%	10.8%	15.2%	2.0%	28.3%	21.6%	1.9%	6.0%	0.2%	10.6%	7.8%
2005	0.0%	2.6%	2.2%	45.6%	22.4%	0.0%	1.5%	1.3%	42.0%	19.8%		1.0%		36.9%	16.8%
2006		2.3%		43.3%	19.8%		0.5%		36.8%	16.1%				23.2%	10.0%
2007	1.5%	4.4%	0.0%	24.0%	12.0%	1.5%	4.4%	0.0%		2.3%					
2008															
2009	0.3%		0.1%	8.9%	4.1%										
2010															
2011	19.4%	7.7%	9.6%	55.0%	33.8%	13.2%	7.7%	9.0%	34.1%	24.0%		6.1%	6.5%		6.2%
4ii (sector allocation 2) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	15.9%	15.3%	5.0%	36.1%	27.0%	2.4%	10.2%	1.8%	33.8%	20.9%		5.0%		11.7%	7.5%
2005	0.0%	2.1%	1.7%	47.9%	22.9%	0.0%	1.0%	0.2%	43.0%	19.6%		0.8%		38.8%	17.5%
2006		0.9%		43.5%	19.2%				40.4%	17.5%				28.3%	12.3%
2007	1.5%	4.4%	0.0%	24.8%	12.3%	0.1%	4.2%		15.6%	8.3%					
2008															
2009			0.1%	9.2%	4.2%										
2010															
2011	15.5%	7.7%	9.4%	55.7%	33.7%	3.0%	6.7%	7.4%	41.5%	25.2%			5.4%		2.6%
6 (sector allocation 3) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	9.3%	15.2%	3.5%	39.1%	27.0%	0.0%	5.5%	0.2%	35.0%	18.4%		3.1%		25.4%	12.8%
2005	0.0%	1.4%	1.5%	51.1%	23.9%		1.0%		44.2%	20.0%				40.4%	17.8%
2006		0.5%		43.9%	19.2%				42.4%	18.3%				34.5%	14.9%
2007	1.5%	4.4%	0.0%	27.2%	13.3%				20.5%	8.2%					
2008				4.0%	1.6%										
2009				10.4%	4.7%				4.4%	2.0%					
2010															
2011	12.6%	7.6%	9.2%	57.0%	34.0%		5.5%	6.7%	43.9%	25.1%			4.3%	19.9%	10.7%

Table 6-12 Alternative 4, Option 1a: Estimated hypothetical B season nominal gross revenue at risk, as a percent of total annual revenue, due to diverted fishing activities based on historical fishing grounds by sector allocation (panels) and trigger cap levels for Option 1a, 2004-2011.

2ii (sector allocation 1) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	7.9%	6.7%	2.4%	18.0%	12.7%	4.7%	6.5%	0.8%	14.3%	9.9%	0.8%	2.6%	0.1%	5.3%	3.6%
2005	0.0%	1.2%	1.0%	23.3%	11.0%	0.0%	0.7%	0.6%	21.5%	9.7%		0.5%		18.8%	8.2%
2006		1.1%	0.0%	22.5%	9.9%		0.2%		19.1%	8.0%				12.0%	5.0%
2007	0.8%	2.2%	0.0%	12.0%	6.0%	0.8%	2.2%	0.0%		1.2%					
2008															
2009	0.1%		0.1%	5.0%	2.2%										
2010															
2011	8.4%	4.6%	5.7%	31.7%	19.3%	5.7%	4.5%	5.3%	19.6%	13.7%		3.6%	3.9%		3.5%
4ii (sector allocation 2) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	7.0%	6.5%	2.1%	18.2%	12.4%	1.0%	4.4%	0.8%	17.1%	9.6%		2.1%		5.9%	3.5%
2005	0.0%	1.0%	0.8%	24.4%	11.2%	0.0%	0.5%	0.1%	21.9%	9.6%		0.4%		19.8%	8.6%
2006		0.4%		22.6%	9.6%				21.0%	8.7%				14.7%	6.1%
2007	0.8%	2.2%	0.0%	12.4%	6.2%	0.0%	2.1%		7.8%	4.2%					
2008															
2009			0.1%	5.2%	2.3%										
2010															
2011	6.7%	4.6%	5.6%	32.1%	19.2%	1.3%	4.0%	4.4%	23.9%	14.3%			3.2%		1.5%
6 (sector allocation 3) Option 1a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	4.1%	6.5%	1.5%	19.8%	12.4%	0.0%	2.3%	0.1%	17.7%	8.5%		1.3%		12.8%	5.9%
2005	0.0%	0.7%	0.7%	26.1%	11.7%		0.5%		22.5%	9.8%				20.6%	8.7%
2006		0.2%		22.8%	9.6%				22.0%	9.1%				17.9%	7.4%
2007	0.8%	2.2%	0.0%	13.6%	6.7%				10.3%	4.1%					
2008				2.1%	0.9%										
2009				5.8%	2.5%				2.5%	1.1%					
2010															
2011	5.5%	4.5%	5.5%	32.9%	19.4%		3.3%	4.0%	25.3%	14.3%			2.5%	11.5%	6.1%

through Table 6-21 provide estimates of gross revenue at risk, percent of total B season gross revenue, and percent of total annual gross revenue under each of options 1b, 2a, and 2b. The potential impact of Alternative 4, option 1b in the years with greatest gross revenue impacts under this alternative and under the most restrictive PSC cap of 7,800 non-Chinook salmon are estimated to be approximately $85 million and $88 million in 2005 and 2011, respectively. The 2005 gross value is composed of $77 million from the CV sector, $2 million from the CP sector, and $6 million from the Mothership sector. The 2011 gross value is composed of $73 million from the CV sector, $4 million from the CP sector, $11 million from the Mothership sector, and $1 million from CDQ pollock fisheries.

As is expected, relaxing the trigger caps has the result of decreasing the gross revenue at risk. The 2011 CV gross revenue at risk (scenario 1), for example, decreases from $73 million to $58 million and to $17 million as the trigger cap is relaxed to 23,400 and 62,400. In contrast to option 1a, the effect of shifting from allocation scenario 1 to allocation scenario 2 and then allocation scenario 3 is to slightly increase the CV sector impacts. The 2011 CV gross revenue at risk, for example, remained at $73 million when shifting to allocation scenario 2 and increased by just $1 million to $74 million under allocation scenario 3.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are very small (less than 5 percent) in nearly all years under consideration. When considering gross

revenue at risk as a percent of annual total gross revenue the potential impacts appear to be considerably reduced in almost all years, allocation scenarios, and cap levels for all sectors other than the CV sector. Thus, it is not likely that the CDQ, CP, or Mothership sectors will have difficulty mitigating gross revenue at risk under Alternative 4, option 1b. The CV sector, in contrast, bears more than 20 percent of its B season gross revenue being placed at risk in several of the years within this retrospective analysis and, therefore, would likely experience costs associated with effort relocation.

Table 6-13 Alternative 4, Option 1b: Estimated hypothetical nominal gross revenue at risk ($ millions) due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels for Option1b, 2004-2011.

2ii (sector allocation 1) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$2	$22	$9	$18	$51		$19	$8		$27		$18	$1		$19
2005		$2	$6	$77	$85		$2	$5	$56	$64		$1	$3	$46	$50
2006		$4		$54	$58		$4		$49	$53		$0		$37	$37
2007		$1	$0	$3	$4										
2008															
2009	$0	$0	$2	$7	$9				$1	$1					
2010			$4		$4										
2011	$1	$4	$11	$73	$88	$0	$3	$11	$58	$71		$3	$9	$17	$28
4ii (sector allocation 2) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$20	$9	$28	$57		$18	$7		$25		$14			$14
2005		$2	$6	$79	$87		$1	$4	$64	$69			$1	$49	$51
2006		$4		$55	$59		$1		$50	$50				$45	$45
2007		$0	$0	$6	$7										
2008															
2009			$1	$10	$11				$1	$1					
2010			$0	$9	$9										
2011	$0	$3	$11	$73	$87		$3	$10	$59	$72		$0	$4	$27	$32
6 (sector allocation 3) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$19	$9	$34	$62		$18	$4	$6	$27		$0			$0
2005		$2	$5	$90	$97		$0	$3	$70	$74				$52	$52
2006		$4		$56	$60				$51	$51				$48	$48
2007			$0	$11	$12										
2008				$8	$8										
2009			$0	$19	$19				$3	$3					
2010				$19	$19										
2011	$0	$3	$11	$74	$88		$3	$9	$65	$77			$2	$36	$38

Table 6-14 Alternative 4, Option 1b: Estimated hypothetical B season nominal gross revenue at risk, as a percent of B season total gross revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 1b, 2004-2011.

2ii (sector allocation 1) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2003	0.4%	1.2%	1.6%	6.3%	4.2%			0.4%		0.2%					
2004	3.4%	9.7%	4.2%	8.2%	10.2%		8.6%	3.7%		5.5%		8.1%	0.7%		3.9%
2005		0.7%	2.0%	28.1%	13.6%		0.7%	1.9%	20.6%	10.3%		0.2%	1.0%	17.0%	8.1%
2006		1.4%		20.2%	9.4%		1.3%		18.3%	8.5%		0.0%		13.6%	5.9%
2007		0.3%	0.1%	1.0%	0.6%										
2008															
2009	0.3%	0.1%	0.7%	2.8%	1.7%				0.2%	0.1%					
2010			1.6%		0.8%										
2011	1.0%	1.3%	3.1%	23.5%	12.4%	0.8%	0.8%	3.0%	18.7%	10.0%		0.8%	2.6%	5.4%	4.0%
4ii (sector allocation 2) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2003		0.5%	1.6%	9.1%	5.3%										
2004		9.1%	4.1%	12.5%	11.5%		8.1%	3.4%		5.1%		6.1%			2.7%
2005		0.7%	2.0%	29.0%	14.0%		0.5%	1.4%	23.3%	11.1%			0.5%	18.1%	8.2%
2006		1.3%		20.5%	9.5%		0.2%		18.6%	8.1%				16.6%	7.2%
2007		0.1%	0.1%	2.4%	1.1%										
2008															
2009			0.4%	4.0%	2.0%				0.4%	0.2%					
2010			0.1%	3.7%	1.6%										
2011	0.9%	0.8%	3.1%	23.7%	12.2%		0.8%	2.9%	19.1%	10.1%		0.1%	1.2%	8.8%	4.5%
6 (sector allocation 3) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2003			1.6%	12.4%	6.6%				3.5%	1.7%					
2004		8.6%	4.0%	15.0%	12.4%		8.1%	1.7%	2.5%	5.5%		0.2%			0.1%
2005		0.7%	1.9%	32.8%	15.7%		0.0%	1.2%	25.7%	11.9%				19.0%	8.4%
2006		1.3%		21.0%	9.7%				19.0%	8.2%				17.8%	7.7%
2007			0.1%	4.6%	1.9%										
2008				2.9%	1.2%										
2009			0.1%	7.7%	3.5%				1.3%	0.6%					
2010				7.7%	3.3%										
2011	0.8%	0.8%	3.1%	24.1%	12.4%		0.7%	2.7%	20.9%	10.8%			0.5%	11.6%	5.3%

Table 6-15 Alternative 4, Option 1b: Estimated hypothetical B season nominal gross revenue at risk, as a percent of total annual revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels , Option 1b, 2004-2011.

2ii (sector allocation 1) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	1.5%	4.1%	1.8%	4.1%	4.7%		3.7%	1.6%		2.5%		3.4%	0.3%		1.8%
2005		0.3%	0.9%	14.3%	6.7%		0.3%	0.9%	10.5%	5.0%		0.1%	0.5%	8.7%	3.9%
2006		0.7%		10.5%	4.7%		0.6%		9.5%	4.2%		0.0%		7.1%	2.9%
2007		0.1%	0.0%	0.5%	0.3%										
2008															
2009	0.1%	0.0%	0.4%	1.6%	0.9%				0.1%	0.1%					
2010			0.9%		0.4%										
2011	0.4%	0.7%	1.8%	13.6%	7.1%	0.3%	0.5%	1.8%	10.8%	5.7%		0.4%	1.5%	3.1%	2.3%
4ii (sector allocation 2) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		3.9%	1.8%	6.3%	5.3%		3.4%	1.4%		2.3%		2.6%			1.2%
2005		0.3%	0.9%	14.8%	6.9%		0.2%	0.7%	11.9%	5.4%			0.2%	9.2%	4.0%
2006		0.6%		10.6%	4.7%		0.1%		9.6%	4.0%				8.6%	3.6%
2007		0.1%	0.0%	1.2%	0.6%										
2008															
2009			0.2%	2.2%	1.1%				0.2%	0.1%					
2010			0.1%	2.1%	0.9%										
2011	0.4%	0.5%	1.8%	13.7%	7.0%		0.4%	1.7%	11.0%	5.8%		0.1%	0.7%	5.1%	2.6%
6 (sector allocation 3) Option 1b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		3.7%	1.7%	7.6%	5.7%		3.4%	0.7%	1.3%	2.5%		0.1%			0.0%
2005		0.3%	0.9%	16.7%	7.7%		0.0%	0.6%	13.1%	5.8%				9.7%	4.1%
2006		0.6%		10.9%	4.8%				9.8%	4.1%				9.2%	3.8%
2007			0.0%	2.3%	0.9%										
2008				1.5%	0.6%										
2009			0.1%	4.3%	1.9%				0.7%	0.3%					
2010				4.4%	1.8%										
2011	0.3%	0.5%	1.8%	13.9%	7.1%		0.4%	1.6%	12.1%	6.1%			0.3%	6.7%	3.0%

The potential impact of Alternative 4, option 2a in the years with greatest gross revenue impacts under this alternative and under the most restrictive PSC cap of 25,000 non-Chinook salmon area estimated to be approximately $110 million and $183 million in 2004 and 2011, respectively. The 2004 gross value is composed of $67 million from the CV sector, $24million from the CP sector, $10 million from the Mothership sector, and $9 million from the CDQ sector. The 2011 gross value is composed of $133 million from the CV sector, $17 million from the CP sector, $24 million from the Mothership sector, and $9 million from CDQ pollock fisheries.

As is expected, relaxing the trigger caps has the result of decreasing the gross revenue at risk. The 2011 CV gross revenue at risk (scenario 1), for example, decreases from $133 million to $77 million and to zero as the trigger cap is relaxed to 75,000 and 200,000. The effect of shifting from allocation scenario 1 to allocation scenario 2 and then allocation scenario 3 is to slightly increase the CV sector impacts but has very little effect on impacts in the other sectors. The 2011 CV gross revenue at risk, for example, increased to $133 million when shifting to allocation scenario 2 and increased by just $3 million to $136 million under allocation scenario 3.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are relatively small in nearly all years except for 2004 and 2011. In both 2004 and 2011 CDQ impacts, for example, are approximately 17 percent of B season gross revenue. Potential impacts in the CP sector are estimated to be about 11 percent and 5 percent in 2004 and 2011, respectively, while Mothership

sector impacts are estimated to be about 5 percent and 7 percent in 2004 and 2011, respectively. In contrast, CV impacts exceed 30 percent in several years and were 43 percent of B season gross revenue in 2011.

When considering gross revenue at risk as a percent of annual total gross revenue the potential impacts appear to be considerably reduced in almost all years, allocation scenarios, and cap levels for all sectors other than the CV sector. Thus, it is not likely that the CDQ, CP, or Mothership sectors will have difficulty mitigating gross revenue at risk under Alternative 4, option 2a. The CV sector, in contrast, bears as much as 25 percent of its gross revenue being placed at risk within this retrospective analysis and, therefore, would likely experience costs associated with effort relocation.

Table 6-16 Alternative 4, Option 2a: Estimated hypothetical nominal gross revenue at risk ($ millions) due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels for Option 2a, 2004-2011.

2ii (sector allocation 1) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$9	$24	$10	$67	$110	$5	$23	$4	$55	$87	$1	$7	$0	$17	$25
2005	$0	$3	$5	$100	$108	$0	$1	$2	$90	$94		$1		$77	$78
2006		$5	$0	$98	$103		$1		$82	$83				$53	$53
2007	$1	$10	$0	$48	$60	$1	$10	$0		$11					
2008															
2009	$0		$0	$22	$22										
2010															
2011	$9	$17	$24	$133	$183	$6	$16	$23	$77	$122		$12	$16		$28
4ii (sector allocation 2) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$8	$23	$9	$68	$107	$1	$12	$4	$66	$83		$7		$20	$26
2005	$0	$2	$3	$104	$110	$0	$1	$0	$93	$94		$1		$82	$83
2006		$1		$99	$100				$92	$92				$64	$64
2007	$1	$10	$0	$49	$61		$10		$32	$42					
2008															
2009			$0	$22	$22										
2010															
2011	$7	$16	$24	$136	$183	$1	$14	$18	$98	$131			$14		$14
6 (sector allocation 3) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$4	$23	$7	$74	$109	$0	$7	$0	$67	$74		$3		$49	$53
2005	$0	$1	$3	$113	$117		$1		$96	$97				$86	$86
2006		$1		$100	$100				$96	$96				$76	$76
2007	$1	$10	$0	$51	$62				$44	$44					
2008				$11	$11										
2009				$23	$23				$11	$11					
2010															
2011	$6	$16	$23	$139	$185		$12	$16	$106	$133			$12	$55	$67

Table 6-17 Alternative 4, Option 2a: Estimated hypothetical B season nominal gross revenue at risk, as a percent of B season total gross revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 2a, 2004-2011.

2ii (sector allocation 1) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	17.1%	10.7%	4.7%	29.8%	22.1%	10.2%	10.2%	1.8%	24.6%	17.5%	1.8%	3.0%	0.2%	7.7%	5.1%
2005	0.0%	1.2%	1.6%	36.4%	17.4%	0.0%	0.5%	0.8%	33.0%	15.2%		0.3%		28.2%	12.6%
2006		1.6%		36.6%	16.6%		0.2%		30.6%	13.3%				19.6%	8.5%
2007	1.5%	3.4%	0.0%	19.3%	9.6%	1.5%	3.4%	0.0%		1.8%					
2008															
2009	0.3%		0.1%	8.7%	4.0%										
2010															
2011	16.6%	4.8%	7.0%	43.2%	25.8%	11.4%	4.7%	6.5%	24.9%	17.2%		3.6%	4.5%		4.0%
4ii (sector allocation 2) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	15.1%	10.2%	4.3%	30.0%	21.6%	1.8%	5.5%	1.7%	29.5%	16.7%		3.0%		8.7%	5.3%
2005	0.0%	0.8%	1.2%	38.1%	17.7%	0.0%	0.4%	0.1%	33.9%	15.2%		0.3%		30.1%	13.4%
2006		0.4%		36.8%	16.1%				34.1%	14.8%				24.0%	10.4%
2007	1.5%	3.4%	0.0%	19.7%	9.7%		3.3%		12.9%	6.8%					
2008															
2009			0.1%	8.9%	4.0%										
2010															
2011	13.4%	4.7%	6.8%	44.0%	25.8%	2.2%	4.0%	5.0%	31.8%	18.4%			4.1%		2.0%
6 (sector allocation 3) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	8.7%	10.2%	3.3%	33.0%	21.8%	0.0%	3.0%	0.2%	29.8%	14.9%		1.5%		21.8%	10.6%
2005	0.0%	0.5%	0.9%	41.2%	18.8%		0.3%		35.0%	15.6%				31.5%	13.9%
2006		0.2%		37.2%	16.2%				35.9%	15.5%				28.3%	12.3%
2007	1.5%	3.4%	0.0%	20.2%	9.9%				17.6%	7.1%					
2008				4.0%	1.6%										
2009				9.4%	4.2%				4.4%	2.0%					
2010															
2011	11.3%	4.7%	6.6%	45.2%	26.0%		3.4%	4.6%	34.2%	18.8%			3.4%	17.8%	9.4%

Table 6-18 Alternative 4, Option 2a: Estimated hypothetical B season nominal gross revenue at risk, as a percent of total annual revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 2a, 2004-2011.

2ii (sector allocation 1) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	7.5%	4.6%	2.0%	15.1%	10.2%	4.5%	4.3%	0.8%	12.4%	8.1%	0.8%	1.3%	0.1%	3.9%	2.3%
2005	0.0%	0.6%	0.8%	18.6%	8.5%	0.0%	0.2%	0.4%	16.8%	7.4%		0.2%		14.4%	6.2%
2006		0.8%	0.0%	19.0%	8.2%		0.1%		15.9%	6.6%				10.2%	4.2%
2007	0.7%	1.7%	0.0%	9.7%	4.8%	0.7%	1.7%	0.0%		0.9%					
2008															
2009	0.1%		0.1%	4.8%	2.1%										
2010															
2011	7.2%	2.8%	4.1%	24.9%	14.7%	5.0%	2.8%	3.8%	14.3%	9.8%		2.1%	2.7%		2.3%
4ii (sector allocation 2) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	6.7%	4.3%	1.8%	15.2%	9.9%	0.8%	2.3%	0.7%	14.9%	7.7%		1.3%		4.4%	2.4%
2005	0.0%	0.4%	0.5%	19.4%	8.7%	0.0%	0.2%	0.1%	17.3%	7.4%		0.1%		15.4%	6.6%
2006		0.2%		19.1%	8.0%				17.7%	7.3%				12.4%	5.2%
2007	0.7%	1.7%	0.0%	9.9%	4.9%		1.6%		6.5%	3.4%					
2008															
2009			0.1%	5.0%	2.2%										
2010															
2011	5.8%	2.8%	4.0%	25.4%	14.7%	1.0%	2.4%	3.0%	18.3%	10.5%			2.4%		1.1%
6 (sector allocation 3) Option 2a															
Cap:			**25,000**					**75,000**					**200,000**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	3.8%	4.3%	1.4%	16.7%	10.0%	0.0%	1.3%	0.1%	15.1%	6.9%		0.7%		11.0%	4.9%
2005	0.0%	0.2%	0.4%	21.0%	9.2%		0.2%		17.9%	7.6%				16.1%	6.8%
2006		0.1%		19.3%	8.0%				18.6%	7.7%				14.7%	6.1%
2007	0.7%	1.7%	0.0%	10.1%	5.0%				8.8%	3.6%					
2008				2.1%	0.9%										
2009				5.3%	2.3%				2.4%	1.1%					
2010															
2011	4.9%	2.8%	3.9%	26.0%	14.8%		2.0%	2.7%	19.7%	10.7%			2.0%	10.3%	5.3%

The potential impact of Alternative 4 option 2b in the years with greatest gross revenue impacts under this alternative and under the most restrictive PSC cap of 7,800 non-Chinook salmon with allocation scenario 1 are estimated to be approximately $54 million and $52 million in 2005 and 2011, respectively. The 2005 gross value is composed of $51 million from the CV sector, less than $1 million from the CP sector, and 3 million from the Mothership sector. The 2011 gross value is composed of $54 million from the CV sector, $1 million from the CP sector, $7 million from the Mothership sector, and less than $1 million from CDQ pollock fisheries. Of note is that these impacts tend to increase under allocation scenarios 2 and 3 in the CV sector with little or no change in the estimates for the other sectors.

In slight contrast with analysis of the previous options that showed conservable impacts in 2004 and 2011 in all sectors, the percentage of B season gross revenue put at risk in all sectors other than the CV sector are relatively small(less than 3 percent) in all years under consideration. CV sector impacts; however, are nearly 19 percent and 15 percent in 2005 and 2011, respectively.

When considering gross revenue at risk as a percent of annual total gross revenue the potential impacts appear to be considerably reduced in almost all years, allocation scenarios, and cap levels for all sectors other than the CV sector. Thus, it is not likely that the CDQ, CP, or Mothership sectors will have difficulty mitigating gross revenue at risk under Alternative 3, option 2a. The CV sector, in contrast, bears as much as 10 percent of its annual gross revenue being placed at risk within this retrospective analysis.

Table 6-19 Alternative 4, Option 2b: Estimated hypothetical nominal gross revenue at risk ($ millions) due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels for Option 2b, 2004-2011

2ii (sector allocation 1) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	$2	$4	$4	$17	$26		$4	$4		$8		$4	$1		$5
2005		$0	$3	$51	$54		$0	$3	$31	$34		$0	$1	$24	$25
2006		$1		$39	$40		$1		$34	$35				$23	$23
2007				$0	$0										
2008															
2009			$0	$5	$5				$1	$1					
2010			$3		$3										
2011	$0		$7	$45	$52			$7	$33	$40			$6	$3	$9
4ii (sector allocation 2) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$4	$4	$26	$34		$4	$4		$8		$3			$3
2005		$0	$3	$53	$56		$0	$2	$38	$39			$1	$25	$26
2006		$1		$40	$40				$35	$35				$31	$31
2007				$1	$1										
2008															
2009			$0	$8	$8				$1	$1					
2010			$0	$1	$1										
2011	$0		$7	$45	$52			$6	$34	$40			$3	$7	$10
6 (sector allocation 3) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		$4	$4	$29	$36		$4	$3	$6	$12					
2005		$0	$3	$62	$65			$1	$44	$46				$28	$28
2006		$1		$41	$42				$36	$36				$33	$33
2007				$4	$4										
2008				$4	$4										
2009			$0	$13	$13				$2	$2					
2010				$2	$2										
2011			$7	$47	$53			$6	$37	$43			$1	$15	$16

Table 6-20 Alternative 4, Option 2b: Estimated hypothetical B season nominal gross revenue at risk, as a percent of B season total gross revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 2b, 2004-2011.

2ii (sector allocation 1) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	3.0%	1.6%	1.9%	7.5%	5.3%		1.6%	1.9%		1.6%		1.6%	0.7%		1.0%
2005		0.0%	1.2%	18.6%	8.7%		0.0%	1.0%	11.4%	5.5%		0.0%	0.4%	8.9%	4.1%
2006		0.3%		14.5%	6.4%		0.3%		12.8%	5.7%				8.6%	3.7%
2007				0.1%	0.0%										
2008															
2009			0.1%	1.9%	0.9%				0.2%	0.1%					
2010			1.1%		0.5%										
2011	0.2%		2.0%	14.6%	7.3%			1.9%	10.7%	5.6%			1.7%	0.9%	1.2%
4ii (sector allocation 2) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		1.6%	1.9%	11.6%	6.8%		1.6%	1.8%		1.5%		1.5%			0.7%
2005		0.0%	1.1%	19.4%	9.1%		0.0%	0.6%	13.8%	6.3%			0.4%	9.3%	4.3%
2006		0.3%		14.8%	6.5%				13.0%	5.6%				11.4%	4.9%
2007				0.5%	0.2%										
2008															
2009			0.1%	3.0%	1.4%				0.4%	0.2%					
2010			0.0%	0.3%	0.2%										
2011	0.1%		2.0%	14.7%	7.4%			1.8%	11.0%	5.6%			0.7%	2.3%	1.4%
6 (sector allocation 3) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		1.6%	1.9%	12.7%	7.3%		1.6%	1.3%	2.5%	2.5%					
2005		0.0%	1.1%	22.8%	10.6%			0.4%	16.2%	7.4%				10.2%	4.5%
2006		0.3%		15.3%	6.7%				13.4%	5.8%				12.3%	5.3%
2007				1.5%	0.6%										
2008				1.4%	0.6%										
2009			0.0%	5.3%	2.4%				0.7%	0.3%					
2010				0.6%	0.3%										
2011			2.0%	15.1%	7.5%			1.8%	12.0%	6.1%			0.3%	4.8%	2.3%

Table 6-21 Alternative 4, Option 2b: Estimated hypothetical B season nominal gross revenue at risk, as a percent of total annual gross revenue, due to diverted fishing activities from historical fishing grounds by sector allocation (panels) and trigger cap levels, Option 2b, 2004-2011.

2ii (sector allocation 1) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004	1.3%	0.7%	0.8%	3.8%	2.4%		0.7%	0.8%		0.7%		0.7%	0.3%		0.5%
2005		0.0%	0.6%	9.5%	4.3%		0.0%	0.5%	5.8%	2.7%		0.0%	0.2%	4.5%	2.0%
2006		0.1%		7.5%	3.2%		0.1%		6.6%	2.8%				4.5%	1.9%
2007				0.1%	0.0%										
2008															
2009			0.1%	1.1%	0.5%				0.1%	0.1%					
2010			0.6%		0.3%										
2011	0.1%		1.2%	8.4%	4.2%			1.1%	6.2%	3.2%			1.0%	0.5%	0.7%
4ii (sector allocation 2) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		0.7%	0.8%	5.9%	3.1%		0.7%	0.8%		0.7%		0.6%			0.3%
2005		0.0%	0.5%	9.9%	4.5%		0.0%	0.3%	7.0%	3.1%			0.2%	4.7%	2.1%
2006		0.1%		7.7%	3.2%				6.7%	2.8%				5.9%	2.5%
2007				0.3%	0.1%										
2008															
2009			0.0%	1.7%	0.8%				0.2%	0.1%					
2010			0.0%	0.2%	0.1%										
2011	0.1%		1.2%	8.5%	4.2%			1.1%	6.3%	3.2%			0.4%	1.3%	0.8%
6 (sector allocation 3) Option 2b															
Cap:			**7,800**					**23,400**					**62,400**		
	CDQ	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**	**CDQ**	**CP**	**M**	**CV**	**All fleet**
2004		0.7%	0.8%	6.4%	3.4%		0.7%	0.6%	1.3%	1.1%					
2005		0.0%	0.5%	11.6%	5.2%			0.2%	8.3%	3.6%				5.2%	2.2%
2006		0.1%		7.9%	3.3%				7.0%	2.9%				6.4%	2.6%
2007				0.7%	0.3%										
2008				0.7%	0.3%										
2009			0.0%	3.0%	1.3%				0.4%	0.2%					
2010				0.4%	0.1%										
2011			1.2%	8.7%	4.3%			1.0%	6.9%	3.5%			0.2%	2.8%	1.3%

6.8 Implications of Sector Transfers and Rollovers

As noted in methods in the accompanying EA, the analysis of potential pollock impacts assumes between cooperative transferability. Between sector transferability is evaluated here for Alternative 2, option 1a for illustrative purposes. This option assumes “perfect” transferability in that sectors would exchange allocated chum salmon PSC freely.

Actual transferability options would be initially from sector specific allocations and then in a given year, a “clean” sector could transfer their chum salmon PSC to a sector that requires more. Logically this poses challenges for analysis because the conditions for a transfer would have to be that the “clean” sector would know in advance that they have salmon to transfer to a sector needing more PSC salmon to extend their pollock fishing. Alternatively the clean sector could finish their pollock fishing earlier than the sector needing more PSC salmon and transfer at that time. Simulating either condition would require apriori knowledge about the interaction between sectors which are unknown. Additionally, such a system will add complexity to management and enforcement, and will obviously result in higher salmon bycatch (within a cap) and less foregone pollock.

To evaluate this option, one scenario for Alternative 2, option 1a) with a cap of 50,000 and sector allocation 6 was examined. In 2005 had this scenario been in place all sectors would have come up against their cap so there would be no transfers (with motherships and shorebased CV sectors hitting their cap on the 2nd and 4th of July, respectively). In 2006, shorebased boats would have hit their cap on June 14th, and remarkably all other sectors stay below their cap. Assuming somehow that the other sectors would know how much salmon they would catch at the end of the year, then the difference between the remaining salmon and the sum of their caps is 7,645 chum. That amount would not be enough for the shorebased sector to fish even one more day: their initial allocation is 22,385 salmon and on June 13th they went from 13,838 salmon to 30,390. In summary, the idea of transfers would be beneficial in principle; however, "what ifs" evaluations from historical data are limited to illustrate performance benefits.

6.9 Implications of Sector and Cooperative level Quota Share Allocation of PSC Caps

Under Alternative 2 and Alternative 4, Sector and Cooperative level allocations may be adopted. If the non-Chinook salmon PSC is allocated among the sectors and an allocation is made to the inshore sector then the cooperative provisions could allow further allocation of transferable or non-transferable salmon PSC allocations to the inshore cooperatives. Each inshore cooperative and the inshore limited access fishery (if the inshore limited access fishery existed in a particular year) would receive a salmon allocation managed at the cooperative level. If the cooperative or limited access fishery salmon cap is reached, the cooperative or limited access fishery must stop fishing for pollock. The initial allocation of salmon by cooperative within the inshore CV fleet or to the limited access fishery would be based upon the proportion of total sector pollock catch associated with the vessels in the cooperative or limited access fishery (see EA Chapter 2).

Also under Alternatives 2 and 4 are options to allow transfers among inshore cooperatives, provided that sector allocations are made and further allocated among the inshore cooperatives and the inshore limited access fishery (if the inshore limited access fishery existed in a particular year). These provisions would allow intercooperative leases of non-Chinook salmon PSC allocations or industry initiated transfers with the suboptions of 50 percent, 70 percent and 90 percent as defined for sector transfers. Under these options, when a salmon cooperative cap is reached, the cooperative must stop fishing for pollock and may lease additional non-Chinook salmon PSC allocation or arrange a voluntary transfer from another inshore cooperative. These provisions would provide additional opportunity for the inshore cooperatives to mitigate effects of non-Chinook salmon PSC caps in essentially the same way that transfers provide that opportunity at the overall sector level.

Cooperative provisions under a binding hard cap have the potential to mitigate some of the potential for an induced race for fish, at least among the inshore cooperatives. Allocation of PSC to the cooperative level converts the allocation by sector into smaller allocations at the inshore cooperative level. Each inshore cooperative would then have to manage the operations of its members to stay under their specific cap, or stop fishing. As such, there are clear economic incentives to avoid PSC. At the larger sector level, those economic incentives are somewhat diminished as higher capacity operators may see an advantage in catching their pollock allocation quickly, with little regard for non-Chinook salmon PSC so long as the sector level PSC allocation is not exceeded. In such circumstances, the smallest or least capable catcher vessels may be adversely affected by the actions of the larger, more capable, vessels (i.e., the incentives to reopen the "race-for-fish," at least at the sector level. This reality, in turn, could affect the formation and membership of the inshore cooperatives themselves, resulting in "capital stuffing" within cooperatives. It is not clear at present to what extent this might become a reality; however, allocation at the inshore cooperative level may mitigate some of the risk associated with the implications of a sector level race for fish for the CV sector.

As the Council's Scientific and Statistical Committee (SSC) correctly observed (October 2008), there is a fundamental difference between a target or retainable incidental catch "*allocation*," on the one hand, and a PSC limit "*allowance*," on the other. They state, in relevant part, "*The former imparts a harvest 'use privilege', while the latter must be regarded as a "prohibition" against harvest (to the maximum extent practicable), with an absolute cap. No "use privilege" is implied by a PSC …. Instead, every practicable effort is required to be made to avoid use of this PSC, and if avoidance is not possible, to minimize its occurrence."* In the former case, the allocation establishes a use-privilege and provides for conversion of the non-target catch to private ownership. In the case of a PSC allowance, no use-privilege authorizing removal of a specific amount of resource is conveyed and conversion of PSC to private ownership is strictly prohibited. These are crucial differences that should not be lost sight of. Indeed, this is so critical a distinction that it has been enshrined as National Standard 9 of the Magnuson-Stevens Act:

> (9) Conservation and management measures shall, to the extent practicable, (A) minimize PSC and (B) to the extent PSC cannot be avoided, minimize the mortality of such PSC.

This view of PSC limits appears to conflict with proposals that envision transfer, trading, or rolling-over of residual non-Chinook PSC amounts, between AFA pollock entities or sectors. This is so, because a "sector transfer provision" conceptually suggests that, once a PSC hard cap level is chosen, it may be acceptable for non-Chinook salmon PSC to *achieve* that level of removal. If that interpretation is adopted, then it may also be acceptable to allow sectors that do not remove all of their non-Chinook salmon PSC allowance to transfer it to other sectors, in order to facilitate continued exploitation of the available pollock resource. Redistributing residual non-Chinook salmon PSC, would, it is asserted, mitigate some portion of the forgone pollock gross revenues attributable to excessive PSC of non-Chinook salmon by one or another AFA element. This interpretation of what the non-Chinook salmon PSC cap constitutes seemingly reverses the SSC's referenced concept of PSC apportionment. That is, the language of Alternative 2, Component 3, option 1 would, in effect, establish non-Chinook PSC amounts as tradable incidental catch "*allocation*," with commercially negotiable use-privileges to removal (although not conversion to private ownership) of a specific quantity of non-Chinook salmon. This clearly changes the relationship of non-Chinook salmon PSC within the pollock industry, making it just another economic input to production that can be traded, sold, bartered, or withheld in the competitive prosecution of the Bering Sea pollock fishery.

Alternatively, it may be preferable to define a hard cap amount as an upper bound on non-Chinook salmon PSC with the intent to promote actions that minimize non-Chinook salmon PSC under that cap. Such an action might be deemed appropriate in order to promote greater non-Chinook salmon conservation, than afforded under full transferability, up to the overall cap, while still affording some opportunity mitigate impact to the pollock fleet. Under Alternative 2, the suboption to Option 1 of Component 3 provides an opportunity for such measures. The suboption would limit transfers to a) 50 percent, b) 70 percent or c) 90 percent of the non-Chinook salmon that is available to the transferring entity at the time of transfer. Clearly, more non-Chinook salmon would be conserved with the 50 percent transferability than with 70 percent or 90 percent, although far fewer than without transferable allocations, and the reverse is true of mitigation of adverse impacts on pollock fleet gross revenue. Unlike Alternative 2, Alternative 4 does not contain a provision to limit the amount an allocation that can be transferred.

Interestingly, if no transfer provision were recommended under Alternative 2, the CDQ non-Chinook salmon sector level cap would continue to be managed as it is under status quo, with further allocation of the CDQ cap among the six CDQ groups, transferable allocations within the CDQ Program, and a prohibition against a CDQ group exceeding its non-Chinook salmon PSC allocation. In other words, the CDQ groups already have transferable non-Chinook salmon PSC caps and would continue to enjoy that flexibility in the absence of inclusion of transferability options for all sectors.

An important distinction should be made between voluntary transfers and rollovers. Voluntary transfers are industry initiated and fully voluntary. Meaning, the entity that represents a sector that has unused non-Chinook salmon PSC must request the transfer. If that entity does not feel compelled to make a voluntary transfer, or an entity cannot be created or cannot reach consensus among members to make the transfer, then some non-Chinook salmon PSC allocation could be unused and, potentially, some pollock that could otherwise have been harvested if the transfer have been made would remain unharvested. In contrast, a rollover managed by NMFS is a somewhat automatic reapportionment that is not voluntary and, thus, does not suffer from the risks associated with voluntary transfers.

While this discussion has used terminology more appropriate to hard caps, it is also applicable to the triggered closures of Alternative 4, but in a slightly different way. Under the triggered closure, NMFS would not issue fishery closures once the trigger cap was reached for each sector. Rather, the trigger closures would be managed similar to current management of the trigger closures under the CDQ Program. Each sector would receive a transferable trigger cap allocation, and vessels participating in that sector would be prohibited from fishing inside an area after the sector's trigger cap is reached.

6.10 Managing and Monitoring the Alternatives

The observer and monitoring requirements currently in place to account for Chinook salmon bycatch under Amendment 91 also enable NMFS to monitor non-Chinook salmon bycatch under a hard cap.
Since the implementation of Amendment 91, NMFS has found several issues that effect the observers' ability to ensure all species of salmon are counted. Therefore, NMFS recommends changes to the Amendment 91 requirements under all alternatives including the no action alternative. The details of these changes are discussed in detail in chapter at 2.6 of the accompanying EA. Catch accounting would rely on the information described for Alternative 1 (status quo) in section 2.1.

As described in the status quo, NMFS currently monitors allocations of Chinook salmon PSC that are allocated to 15 entities, each with two seasonal allocations. ***NMFS strongly recommends that if the Council includes sector and cooperative level allocations of non-Chinook salmon PSC under either Alternative 2 or 3 that those allocations are made to the same sector entities that have been created for allocations of Chinook salmon.*** In other words, the non-Chinook PSC allocations would be made to:

- to the entity representing the catcher/processor sector (currently the CP Salmon Corporation);
- the mothership sector (currently the Mothership Fleet Cooperative);
- the seven inshore cooperatives; and
- the six CDQ groups

Consistent allocation categories for Chinook and non-Chinook salmon would greatly simplify administrative functions for NMFS and the industry. Existing contracts and application to NMFS establishing these entities could be modified to incorporate the responsibility for receiving and managing non-Chinook salmon PSC allocations.

In addition, NMFS has made specific recommendations regarding the necessary regulatory changes that would accompany a revised RHS program under Alternative 3 as well as general recommendations on improved monitoring and enforcement. These recommendations are identified, in detail, in EA section 2.5 and the implications of some of these recommendations are further addressed in section 2.6 The EA treatment of the recommendations is quite extensive and need not be repeated here as specific costs of changes in monitoring and enforcement are not fully known.

NMFS has made a specific recommendation, applicable to all action alternatives, that the ATLAS software be required on all AFA pollock vessels that are less than 125 feet in length. Currently, all catcher vessels greater than 125 feet, catcher processors, and all shoreside and stationary floating processors required to have an observer present are required to maintain a computer and an electronic transmission system such as email for use by an observer. NMFS installs custom software on each of these computers, called ATLAS. Together the hardware and software allow observers to communicate with, and transmit data to, NMFS. In the AFA shoreside pollock fleet about 50 of the 108 catcher vessels currently carry the ATLAS program. The rest of the vessels are not required to carry the ATLAS program because they are less the 125 feet in length. The observer data for these vessels is submitted via fax.

FMA Division staff ensures that data were collected following NMFS protocols and it is normal for there to be many data modifications during this "debriefing" and quality control process. If observers have access to the ATLAS software to enter data then the timeliness and quality of their data is increased. The ATLAS software contains business rules to perform many quality control and data validity checks which dramatically increase the quality of the preliminary data. When data is transmitted electronically, instead of submitted via fax, the time before the data are available for management decreases by 1-3 days. Additionally, observers onboard vessels with the ATLAS software have the ability to communicate directly with FMD Division staff in near real time to address questions regarding sampling as well as notify staff of potential compliance concerns. In these cases, NMFS OLE has been able to address these potential compliance issues with the vessels directly closer to the time when the incident occurred. This allows these vessels to come into compliance sooner and avoid more serious violations of the regulations. Better data quality checks of observer data and increased compliance by vessels both serve to improve NMFS's ability to manage salmon bycatch. For these reasons, NMFS recommends that all alternatives include the requirement for ATLAS software on the AFA catcher vessels less than 125 feet in length and the ability for the observer to transmit their data directly from the vessel's computer with the ATLAS software.

Under all of the alternatives, all participating AFA catcher vessels under 125 feet would be required to install and maintain a computer connected to a communication device such as email for use by an observer. NOAA Fisheries would install custom software on each of these computers. This software would allow the vessel's observer to enter and edit data that is sent electronically to NMFS. Computers that meet NOAA Fisheries specifications described in regulation cost approximately $600 each. Installation of communication equipment could vary dramatically, depending on the upgrades required to provide communication. These costs are difficult to estimate, but the largest about would not be expected to exceed $3100 per vessel. Many vessels in the fleet already have email capability and the installation and ability to transmit would be expected to be minimal. If every AFA catch vessel under 125 feet obtained a new obtained a computer in order to comply with this requirement, the total cost to the fleet would be approximately $33,600. However, because it is not known how many of vessels already have computers that meet these requirements, this sum may greatly overestimate the actual cost to the fleet.

Cost to the agency would include staff time to install, support, and maintain the ATLAS software. These costs are expected to be about $100,000 per year. Additionally, additional NMFS staff may be needed to provide in season support to these new observers. Additional staff requirement are expected to be an additional 1.5 FTE, which would be borne by NMFS.

6.11 Assessment of Potential Impact of the Alternatives on Shoreside Value Added Processing

This assessment provides a breakout of the shoreside processing sector gross revenue (processing value added) by port group. **It is important to recognize that the dollar values in this assessment must not be added to the estimated effects on first wholesale gross revenue provided in the RIR for the aggregated shoreside (S) sector. The potential impact values shown here are a subset of the values provided in the RIR and are intended to highlight the potential effects on value added processing by port group.**

Confidentiality of data regulations necessitates the creation of two port groups. The two port groups that have been created are the Akutan and Dutch Harbor (AKU/DUT) group, and the "All Others" group. 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. These combinations account for all shoreside processing of Bering Sea pollock.

Shown in the tables below are the breakout of ex-vessel and shoreside processing values, as well as their total, and the percent each group-season-year- category represents of the annual total value. These percentages are used 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. 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 economic impact information, while maintaining confidentiality constraints.

Table 6-22 Bering Sea pollock nominal ex-vessel value by season and port group ($millions), 2004-2011.

Season	Port Group	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$73	$85	$85	$78	$90	$59	$48	$62
	Others	$5	$7	$6	$6	$5	$3	$3	$4
	Total	**$78**	**$91**	**$91**	**$84**	**$95**	**$62**	**$51**	**$66**
B season	AKU/DUT	$75	$88	$92	$78	$99	$75	$64	$94
	Others	$6	$7	$7	$6	$6	$3	$3	$5
	Total	**$80**	**$95**	**$98**	**$84**	**$105**	**$78**	**$67**	**$99**
	Grand Total	**$159**	**$186**	**$190**	**$168**	**$200**	**$140**	**$118**	**$165**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Table 6-23 Bering Sea pollock shoreside processing nominal value added by season and port group ($millions), 2004-2011.

Season	Port Group	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$141	$167	$154	$160	$160	$133	$138	$192
	Others	$2	$4	$4	$4	$2	$2	$0	$1
	Total	**$142**	**$171**	**$157**	**$165**	**$161**	**$135**	**$138**	**$193**
B season	AKU/DUT	$144	$175	$166	$161	$176	$168	$181	$253
	Others	$2	$4	$4	$5	$2	$3	$1	$1
	Total	**$145**	**$179**	**$169**	**$166**	**$178**	**$171**	**$182**	**$254**
	Grand Total	**$288**	**$350**	**$326**	**$330**	**$340**	**$306**	**$320**	**$447**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Table 6-24 Bering Sea pollock total shoreside sector nominal value (ex-vessel value plus shoreside processing value added ($millions)) by season and port group, 2004-2011

Season	Port Group	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$214	$252	$239	$238	$249	$192	$186	$255
	Others	$7	$10	$10	$10	$7	$5	$3	$4
	Total	**$221**	**$262**	**$248**	**$249**	**$256**	**$197**	**$189**	**$259**
B season	AKU/DUT	$218	$263	$257	$239	$275	$243	$245	$347
	Others	$7	$11	$10	$10	$8	$6	$4	$6
	Total	**$225**	**$274**	**$268**	**$250**	**$283**	**$249**	**$249**	**$353**
	Grand Total	**$446**	**$536**	**$516**	**$498**	**$539**	**$446**	**$438**	**$612**

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

Table 6-25 B Season Bering Sea pollock processing nominal value, by port group, as a percent of total B season first wholesale gross revenue, 2004-2011.

Port Group	Season	2004	2005	2006	2007	2008	2009	2010	2011
AKU/DUT	B	96.8%	96.1%	96.1%	95.9%	97.3%	97.6%	98.4%	98.4%
All Others	B	3.2%	3.9%	3.9%	4.1%	2.7%	2.4%	1.6%	1.6%

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2007.

The effect of Alternative 2, option 1a, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown in Table 6-26 through
Table 6-28. The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total potential forgone pollock gross revenue from the CV sector. In the worst cases under Option 1a potentially forgone ex vessel value in the Akutan/Dutch Harbor port grouping is estimated to be approximately $85 million and shoreside value added potentially foregone revenue exceeds $153 million. These impacts represent more than 86 percent of ex-vessel, and more than 90 percent of shoreside value added B season total gross revenue and approximately 45 percent and 47 percent of total annual gross revenue in each sector. The vast majority of the potential impacts are attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 2, they

vary similarly with decreasing impact as the cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3.

Table 6-26 Hypothetical potentially forgone ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 2, Option 1a ($ Millions) 2004-2011.

2ii (sector allocation 1)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$39.10	$75.37	$2.90	$0.85	2004	$14.64	$28.23	$1.09	$0.32	2004	$6.88	$13.27	$0.51	$0.15
2005	$67.74	$134.16	$5.21	$3.05	2005	$56.57	$112.03	$4.35	$2.54	2005	$47.55	$94.17	$3.66	$2.14
2006	$84.99	$153.33	$6.08	$3.52	2006	$56.36	$101.68	$4.03	$2.34	2006				
2007	$18.92	$38.94	$1.41	$1.09	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	$55.09	$148.27	$2.82	$0.51	2011					2011				
4ii (sector allocation 2)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$39.38	$75.90	$2.92	$0.86	2004	$15.69	$30.25	$1.16	$0.34	2004	$11.79	$22.72	$0.87	$0.26
2005	$68.38	$135.44	$5.26	$3.07	2005	$58.32	$115.50	$4.49	$2.62	2005	$50.69	$100.40	$3.90	$2.28
2006	$86.00	$155.16	$6.16	$3.56	2006	$69.58	$125.53	$4.98	$2.88	2006	$47.62	$85.92	$3.41	$1.97
2007	$22.09	$45.45	$1.64	$1.27	2007					2007				
2008					2008					2008				
2009	$6.20	$13.89	$0.27	$0.22	2009					2009				
2010					2010					2010				
2011	$57.45	$154.62	$2.95	$0.53	2011					2011				
6 (sector allocation 3)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$40.06	$77.21	$2.97	$0.88	2004	$28.40	$54.74	$2.10	$0.62	2004	$14.95	$28.82	$1.11	$0.33
2005	$69.52	$137.69	$5.35	$3.13	2005	$60.24	$119.31	$4.64	$2.71	2005	$56.84	$112.57	$4.38	$2.56
2006	$86.64	$156.31	$6.20	$3.59	2006	$76.56	$138.13	$5.48	$3.17	2006	$57.51	$103.76	$4.12	$2.38
2007	$28.17	$57.96	$2.09	$1.62	2007					2007				
2008					2008					2008				
2009	$22.11	$49.49	$0.96	$0.79	2009					2009				
2010					2010					2010				
2011	$71.60	$192.70	$3.67	$0.67	2011	$18.51	$49.81	$0.95	$0.17	2011				

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 6-27 Hypothetical potentially forgone ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 2, Option 1a, in percent of B season sector gross revenue, 2004-2011.

2ii (sector allocation 1)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	48.8%	51.9%	3.6%	0.6%	2004	18.3%	19.4%	1.4%	0.2%	2004	8.6%	9.1%	0.6%	0.1%
2005	71.3%	75.1%	5.5%	1.7%	2005	59.6%	62.7%	4.6%	1.4%	2005	50.1%	52.7%	3.9%	1.2%
2006	86.4%	90.5%	6.2%	2.1%	2006	57.3%	60.0%	4.1%	1.4%	2006				
2007	22.5%	23.5%	1.7%	0.7%	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	55.8%	58.4%	2.9%	0.2%	2011					2011				
4ii (sector allocation 2)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	49.2%	52.2%	3.6%	0.6%	2004	19.6%	20.8%	1.5%	0.2%	2004	14.7%	15.6%	1.1%	0.2%
2005	72.0%	75.8%	5.5%	1.7%	2005	61.4%	64.7%	4.7%	1.5%	2005	53.4%	56.2%	4.1%	1.3%
2006	87.4%	91.6%	6.3%	2.1%	2006	70.7%	74.1%	5.1%	1.7%	2006	48.4%	50.7%	3.5%	1.2%
2007	26.3%	27.5%	2.0%	0.8%	2007					2007				
2008					2008					2008				
2009	7.9%	8.1%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	58.2%	60.9%	3.0%	0.2%	2011					2011				
6 (sector allocation 3)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	50.0%	53.1%	3.7%	0.6%	2004	35.5%	37.7%	2.6%	0.4%	2004	18.7%	19.8%	1.4%	0.2%
2005	73.2%	77.1%	5.6%	1.8%	2005	63.4%	66.8%	4.9%	1.5%	2005	59.9%	63.0%	4.6%	1.4%
2006	88.1%	92.3%	6.3%	2.1%	2006	77.8%	81.5%	5.6%	1.9%	2006	58.5%	61.2%	4.2%	1.4%
2007	33.5%	35.0%	2.5%	1.0%	2007					2007				
2008					2008					2008				
2009	28.2%	29.0%	1.2%	0.5%	2009					2009				
2010					2010					2010				
2011	72.5%	76.0%	3.7%	0.3%	2011	18.7%	19.6%	1.0%	0.1%	2011				

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 6-28 Hypothetical potentially forgone ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 2, Option 1a, in percent of total annual sector gross revenue, 2004-2011.

2ii (sector allocation 1)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	24.7%	26.2%	1.0%	0.3%	2004	9.2%	9.8%	0.7%	0.1%	2004	4.3%	4.6%	0.3%	0.1%
2005	36.4%	38.3%	1.5%	0.9%	2005	30.4%	32.0%	2.3%	0.7%	2005	25.6%	26.9%	2.0%	0.6%
2006	44.8%	47.0%	1.9%	1.1%	2006	29.7%	31.1%	2.1%	0.7%	2006				
2007	11.3%	11.8%	0.4%	0.3%	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	33.4%	33.2%	0.6%	0.1%	2011					2011				
4ii (sector allocation 2)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	24.8%	26.4%	1.8%	0.3%	2004	9.9%	10.5%	0.7%	0.1%	2004	7.4%	7.9%	0.6%	0.1%
2005	36.8%	38.7%	2.8%	0.9%	2005	31.3%	33.0%	2.4%	0.7%	2005	27.3%	28.7%	2.1%	0.7%
2006	45.4%	47.5%	3.2%	1.1%	2006	36.7%	38.4%	2.6%	0.9%	2006	25.1%	26.3%	1.8%	0.6%
2007	13.2%	13.8%	1.0%	0.4%	2007					2007				
2008					2008					2008				
2009	4.4%	4.5%	0.2%	0.1%	2009					2009				
2010					2010					2010				
2011	34.8%	34.6%	1.8%	0.1%	2011					2011				
6 (sector allocation 3)														
Cap:	**50,000**				**Cap:**	**200,000**				**Cap:**	**353,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	25.3%	26.8%	1.9%	0.3%	2004	17.9%	19.0%	1.3%	0.2%	2004	9.4%	10.0%	0.7%	0.1%
2005	37.4%	39.4%	2.9%	0.9%	2005	32.4%	34.1%	2.5%	0.8%	2005	30.6%	32.2%	2.4%	0.7%
2006	45.7%	47.9%	3.3%	1.1%	2006	40.4%	42.3%	2.9%	1.0%	2006	30.3%	31.8%	2.2%	0.7%
2007	16.8%	17.5%	1.2%	0.5%	2007					2007				
2008					2008					2008				
2009	15.8%	16.2%	0.7%	0.3%	2009					2009				
2010					2010					2010				
2011	43.4%	43.1%	2.2%	0.1%	2011	11.2%	11.2%	0.6%	0.0%	2011				

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.

The effect of Alternative 2, option 1b, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown in Table 6-29 through Table 6-31. The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total gross revenue at risk from the CV sector. In the worst cases under Otion 1b gross revenue at risk in the ex-vessel value in the Akutan/Dutch Harbor port grouping is estimated to be approximately $39 million and shoreside value added potentially foregone gross revenue is approximately $106 million. These impacts represent nearly 40 percent of ex-vessel, and nearly 42 percent of shoreside value added B season total gross revenue and approximately 24 percent of total annual gross revenue in each sector. The vast majority of the potential impacts are attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 2, they vary similarly with decreasing impact as the cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3.

Table 6-29 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 2, Option 1b ($ Millions) 2004-2011.

2ii (sector allocation 1)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$0.46	$0.89	$0.03	$0.01	2004					2004				
2005	$28.41	$56.27	$2.19	$1.28	2005	$20.47	$40.53	$1.58	$0.92	2005	$14.75	$29.22	$1.14	$0.66
2006	$30.47	$54.98	$2.18	$1.26	2006	$24.89	$44.91	$1.78	$1.03	2006	$19.90	$35.91	$1.42	$0.82
2007					2007					2007				
2008					2008					2008				
2009	$7.54	$16.88	$0.33	$0.27	2009					2009				
2010					2010					2010				
2011	$39.31	$105.81	$2.02	$0.37	2011	$10.62	$28.58	$0.54	$0.10	2011				
4ii (sector allocation 2)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$3.45	$6.66	$0.26	$0.08	2004					2004				
2005	$29.48	$58.39	$2.27	$1.33	2005	$22.38	$44.33	$1.72	$1.01	2005	$18.14	$35.93	$1.40	$0.82
2006	$30.71	$55.40	$2.20	$1.27	2006	$28.46	$51.35	$2.04	$1.18	2006	$21.76	$39.25	$1.56	$0.90
2007					2007					2007				
2008					2008					2008				
2009	$13.17	$29.48	$0.57	$0.47	2009					2009				
2010					2010					2010				
2011	$40.05	$107.78	$2.05	$0.37	2011	$19.64	$52.86	$1.01	$0.18	2011				
6 (sector allocation 3)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$7.61	$14.67	$0.56	$0.17	2004					2004				
2005	$30.84	$61.07	$2.37	$1.39	2005	$23.28	$46.10	$1.79	$1.05	2005	$20.76	$41.12	$1.60	$0.93
2006	$31.56	$56.93	$2.26	$1.31	2006	$29.63	$53.46	$2.12	$1.23	2006	$26.60	$47.99	$1.90	$1.10
2007	$2.44	$5.03	$0.18	$0.14	2007					2007				
2008					2008					2008				
2009	$19.56	$43.78	$0.85	$0.69	2009					2009				
2010					2010					2010				
2011	$41.00	$110.34	$2.10	$0.38	2011	$28.55	$76.83	$1.46	$0.27	2011	$11.02	$29.67	$0.57	$0.10

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 6-30 Hypothetical "At risk " ex-vessel nominal gross revenue and shoreside value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 2, Option 1b, in percent of B season sector gross revenue, 2004-2011.

2ii (sector allocation 1)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	0.6%	0.6%	0.0%	0.0%	2004					2004				
2005	29.9%	31.5%	2.3%	0.7%	2005	21.6%	22.7%	1.7%	0.5%	2005	15.5%	16.4%	1.2%	0.4%
2006	31.0%	32.5%	2.2%	0.7%	2006	25.3%	26.5%	1.8%	0.6%	2006	20.2%	21.2%	1.4%	0.5%
2007					2007					2007				
2008					2008					2008				
2009	9.6%	9.9%	0.4%	0.2%	2009					2009				
2010					2010					2010				
2011	39.8%	41.7%	2.0%	0.1%	2011	10.8%	11.3%	0.6%	0.0%	2011				
4ii (sector allocation 2)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	4.3%	4.6%	0.3%	0.1%	2004					2004				
2005	31.1%	32.7%	2.4%	0.7%	2005	23.6%	24.8%	1.8%	0.6%	2005	19.1%	20.1%	1.5%	0.5%
2006	31.2%	32.7%	2.2%	0.8%	2006	28.9%	30.3%	2.1%	0.7%	2006	22.1%	23.2%	1.6%	0.5%
2007					2007					2007				
2008					2008					2008				
2009	16.8%	17.3%	0.7%	0.3%	2009					2009				
2010					2010					2010				
2011	40.5%	42.5%	2.1%	0.1%	2011	19.9%	20.8%	1.0%	0.1%	2011				
6 (sector allocation 3)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	9.5%	10.1%	0.7%	0.1%	2004					2004				
2005	32.5%	34.2%	2.5%	0.8%	2005	24.5%	25.8%	1.9%	0.6%	2005	21.9%	23.0%	1.7%	0.5%
2006	32.1%	33.6%	2.3%	0.8%	2006	30.1%	31.6%	2.2%	0.7%	2006	27.0%	28.3%	1.9%	0.7%
2007	2.9%	3.0%	0.2%	0.1%	2007					2007				
2008					2008					2008				
2009	25.0%	25.6%	1.1%	0.4%	2009					2009				
2010					2010					2010				
2011	41.5%	43.5%	2.1%	0.2%	2011	28.9%	30.3%	1.5%	0.1%	2011	11.2%	11.7%	0.6%	0.0%

Table 6-31 Hypothetical potentially forgone ex-vessel gross revenue and shoreside nominal value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 2, Option 1b, in percent of total annual sector gross revenue, 2004-2011.

2ii (sector allocation 1)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	0.3%	0.3%	0.0%	0.0%	2003					2004				
2005	15.3%	16.1%	0.6%	0.4%	2003	11.0%	11.6%	0.8%	0.3%	2005	7.9%	8.4%	0.6%	0.2%
2006	16.1%	16.8%	0.7%	0.4%	2003	13.1%	13.8%	0.9%	0.3%	2006	10.5%	11.0%	0.8%	0.3%
2007					2003					2007				
2008					2003					2008				
2009	5.4%	5.5%	0.1%	0.1%	2003					2009				
2010					2003					2010				
2011	23.8%	23.7%	0.5%	0.1%	2003	6.4%	6.4%	0.3%	0.0%	2011				
4ii (sector allocation 2)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	2.2%	2.3%	0.2%	0.0%	2004					2004				
2005	15.8%	16.7%	1.2%	0.4%	2005	12.0%	12.7%	0.9%	0.3%	2005	9.8%	10.3%	0.8%	0.2%
2006	16.2%	17.0%	1.2%	0.4%	2006	15.0%	15.7%	1.1%	0.4%	2006	11.5%	12.0%	0.8%	0.3%
2007					2007					2007				
2008					2008					2008				
2009	9.4%	9.6%	0.4%	0.2%	2009					2009				
2010					2010					2010				
2011	24.3%	24.1%	1.2%	0.1%	2011	11.9%	11.8%	0.6%	0.0%	2011				
6 (sector allocation 3)														
Cap:	**15,600**				**Cap:**	**62,400**				**Cap:**	**110,136**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	4.8%	5.1%	0.4%	0.1%	2004					2004				
2005	16.6%	17.5%	1.3%	0.4%	2005	12.5%	13.2%	1.0%	0.3%	2005	11.2%	11.8%	0.9%	0.3%
2006	16.6%	17.4%	1.2%	0.4%	2006	15.6%	16.4%	1.1%	0.4%	2006	14.0%	14.7%	1.0%	0.3%
2007	1.5%	1.5%	0.1%	0.0%	2007					2007				
2008					2008					2008				
2009	13.9%	14.3%	0.6%	0.2%	2009					2009				
2010					2010					2010				
2011	24.9%	24.7%	1.3%	0.1%	2011	17.3%	17.2%	0.9%	0.1%	2011	6.7%	6.6%	0.3%	0.0%

The effect of Alternative 4, option 1a, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown Table 6-32 through Table 6-43. The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total potential forgone pollock gross revenue from the CV sector. In the worst cases, potentially forgone shoreside value added gross revenue approaches $122 million, or approximately 48 percent of B season total gross revenue and approximately 27 percent of total annual gross revenue. The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 3, they vary similarly with decreasing impact as the trigger cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3. In the tables that follow, estimates are provided for each of options of Alternative 4.

Table 6-32 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 4, Option 1a ($ Millions), 2004-2011.

2ii (sector allocation 1) Option 1a.

Cap:	25,000				Cap:	75,000				Cap:	200,000			
	AKU/DUT		All Others			AKU/DUT		All Others			AKU/DUT		All Others	
Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA
2004	$26.55	$51.18	$1.97	$0.58	2004	$21.08	$40.64	$1.56	$0.46	2004	$7.89	$15.20	$0.58	$0.17
2005	$40.25	$79.71	$3.10	$1.81	2005	$37.07	$73.41	$2.85	$1.67	2005	$32.54	$64.44	$2.50	$1.46
2006	$39.82	$71.83	$2.85	$1.65	2006	$33.81	$61.00	$2.42	$1.40	2006	$21.32	$38.46	$1.53	$0.88
2007	$18.87	$38.84	$1.40	$1.09	2007					2007				
2008					2008					2008				
2009	$6.72	$15.05	$0.29	$0.24	2009					2009				
2010					2010					2010				
2011	$45.22	$121.71	$2.32	$0.42	2011	$28.02	$75.40	$1.44	$0.26	2011				

4ii (sector allocation 2) Option 1a.

Cap:	25,000				Cap:	75,000				Cap:	200,000			
	AKU/DUT		All Others			AKU/DUT		All Others			AKU/DUT		All Others	
Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA
2004	$26.90	$51.85	$1.99	$0.59	2004	$25.23	$48.63	$1.87	$0.55	2004	$8.72	$16.82	$0.65	$0.19
2005	$42.20	$83.58	$3.25	$1.90	2005	$37.91	$75.07	$2.92	$1.70	2005	$34.19	$67.71	$2.63	$1.54
2006	$40.04	$72.23	$2.87	$1.66	2006	$37.16	$67.05	$2.66	$1.54	2006	$26.05	$47.00	$1.86	$1.08
2007	$19.52	$40.16	$1.45	$1.12	2007	$12.22	$25.15	$0.91	$0.70	2007				
2008					2008					2008				
2009	$6.93	$15.52	$0.30	$0.25	2009					2009				
2010					2010					2010				
2011	$45.85	$123.39	$2.35	$0.43	2011	$34.14	$91.89	$1.75	$0.32	2011				

6 (sector allocation 3) Option 1a.

Cap:	25,000				Cap:	75,000				Cap:	200,000			
	AKU/DUT		All Others			AKU/DUT		All Others			AKU/DUT		All Others	
Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA	Year	CV-ExV	SVA	CV-ExV	SVA
2004	$29.16	$56.20	$2.16	$0.64	2004	$26.10	$50.30	$1.93	$0.57	2004	$18.90	$36.44	$1.40	$0.41
2005	$45.03	$89.18	$3.47	$2.02	2005	$38.94	$77.12	$3.00	$1.75	2005	$35.58	$70.47	$2.74	$1.60
2006	$40.39	$72.87	$2.89	$1.67	2006	$38.97	$70.30	$2.79	$1.61	2006	$31.75	$57.29	$2.27	$1.32
2007	$21.35	$43.92	$1.59	$1.23	2007	$16.12	$33.17	$1.20	$0.93	2007				
2008	$4.00	$7.10	$0.22	$0.08	2008					2008				
2009	$7.85	$17.57	$0.34	$0.28	2009	$3.31	$7.40	$0.14	$0.12	2009				
2010					2010					2010				
2011	$46.91	$126.26	$2.41	$0.44	2011	$36.14	$97.26	$1.85	$0.34	2011	$16.40	$44.14	$0.84	$0.15

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 6-33 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale gross revenue by year, season, and aggregated port group under Alternative 4, Option 1a, in percent of B season sector gross revenue, 2004-2009).

2ii (sector allocation 1) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	33.2%	35.2%	2.5%	0.4%	2004	26.3%	28.0%	2.0%	0.3%	2004	9.8%	10.5%	0.7%	0.1%
2005	42.4%	44.6%	3.3%	1.0%	2005	39.0%	41.1%	3.0%	0.9%	2005	34.3%	36.1%	2.6%	0.8%
2006	40.5%	42.4%	2.9%	1.0%	2006	34.4%	36.0%	2.5%	0.8%	2006	21.7%	22.7%	1.6%	0.5%
2007	22.5%	23.5%	1.7%	0.7%	2007					2007				
2008					2008					2008				
2009	8.6%	8.8%	0.4%	0.1%	2009					2009				
2010					2010					2010				
2011	45.8%	48.0%	2.3%	0.2%	2011	28.4%	29.7%	1.5%	0.1%	2011				
4ii (sector allocation 2) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	33.6%	35.7%	2.5%	0.4%	2004	31.5%	33.5%	2.3%	0.4%	2004	10.9%	11.6%	0.8%	0.1%
2005	44.4%	46.8%	3.4%	1.1%	2005	39.9%	42.0%	3.1%	1.0%	2005	36.0%	37.9%	2.8%	0.9%
2006	40.7%	42.6%	2.9%	1.0%	2006	37.8%	39.6%	2.7%	0.9%	2006	26.5%	27.7%	1.9%	0.6%
2007	23.2%	24.3%	1.7%	0.7%	2007	14.5%	15.2%	1.1%	0.4%	2007				
2008					2008					2008				
2009	8.8%	9.1%	0.4%	0.1%	2009					2009				
2010					2010					2010				
2011	46.4%	48.6%	2.4%	0.2%	2011	34.6%	36.2%	1.8%	0.1%	2011				
6 (sector allocation 3) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	36.4%	38.7%	2.7%	0.4%	2004	32.6%	34.6%	2.4%	0.4%	2004	23.6%	25.1%	1.7%	0.3%
2005	47.4%	49.9%	3.7%	1.1%	2005	41.0%	43.2%	3.2%	1.0%	2005	37.5%	39.5%	2.9%	0.9%
2006	41.1%	43.0%	2.9%	1.0%	2006	39.6%	41.5%	2.8%	1.0%	2006	32.3%	33.8%	2.3%	0.8%
2007	25.4%	26.5%	1.9%	0.7%	2007	19.2%	20.0%	1.4%	0.6%	2007				
2008	3.8%	4.0%	0.2%	0.0%	2008					2008				
2009	10.0%	10.3%	0.4%	0.2%	2009	4.2%	4.3%	0.2%	0.1%	2009				
2010					2010					2010				
2011	47.5%	49.8%	2.4%	0.2%	2011	36.6%	38.3%	1.9%	0.1%	2011	16.6%	17.4%	0.9%	0.1%

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 6-34 Hypothetical "at risk" ex-vessel nominal revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 4, Option 1a, in percent of total annual sector revenue, 2004-2011.

2ii (sector allocation 1) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	16.7%	17.8%	0.7%	0.2%	2003	13.3%	14.1%	1.0%	0.2%	2004	5.0%	5.3%	0.4%	0.1%
2005	21.6%	22.8%	0.9%	0.5%	2003	19.9%	21.0%	1.5%	0.5%	2005	17.5%	18.4%	1.3%	0.4%
2006	21.0%	22.0%	0.9%	0.5%	2003	17.8%	18.7%	1.3%	0.4%	2006	11.2%	11.8%	0.8%	0.3%
2007	11.2%	11.8%	0.4%	0.3%	2003					2007				
2008					2003					2008				
2009	4.8%	4.9%	0.1%	0.1%	2003					2009				
2010					2003					2010				
2011	27.4%	27.3%	0.5%	0.1%	2003	17.0%	16.9%	0.9%	0.1%	2011				
4ii (sector allocation 2) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	17.0%	18.0%	1.3%	0.2%	2004	15.9%	16.9%	1.2%	0.2%	2004	5.5%	5.8%	0.4%	0.1%
2005	22.7%	23.9%	1.7%	0.5%	2005	20.4%	21.5%	1.6%	0.5%	2005	18.4%	19.4%	1.4%	0.4%
2006	21.1%	22.1%	1.5%	0.5%	2006	19.6%	20.5%	1.4%	0.5%	2006	13.7%	14.4%	1.0%	0.3%
2007	11.6%	12.2%	0.9%	0.3%	2007	7.3%	7.6%	0.5%	0.2%	2007				
2008					2008					2008				
2009	4.9%	5.1%	0.2%	0.1%	2009					2009				
2010					2010					2010				
2011	27.8%	27.6%	1.4%	0.1%	2011	20.7%	20.6%	1.1%	0.1%	2011				
6 (sector allocation 3) Option 1a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	18.4%	19.5%	1.4%	0.2%	2004	16.5%	17.5%	1.2%	0.2%	2004	11.9%	12.7%	0.9%	0.1%
2005	24.2%	25.5%	1.9%	0.6%	2005	20.9%	22.0%	1.6%	0.5%	2005	19.1%	20.1%	1.5%	0.5%
2006	21.3%	22.3%	1.5%	0.5%	2006	20.6%	21.5%	1.5%	0.5%	2006	16.8%	17.5%	1.2%	0.4%
2007	12.7%	13.3%	0.9%	0.4%	2007	9.6%	10.0%	0.7%	0.3%	2007				
2008	2.0%	2.1%	0.1%	0.0%	2008					2008				
2009	5.6%	5.7%	0.2%	0.1%	2009	2.4%	2.4%	0.1%	0.0%	2009				
2010					2010					2010				
2011	28.4%	28.3%	1.5%	0.1%	2011	21.9%	21.8%	1.1%	0.1%	2011	9.9%	9.9%	0.5%	0.0%

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.

The effect of Alternative 4, option 1b, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown in Table 6-35 through Table 6-37 . The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total potential forgone pollock gross revenue from the CV sector. In the worst cases, potentially forgone shoreside value added gross revenue exceed $53 million, or approximately 21 percent of B season total gross revenue and approximately 12 percent of total annual gross revenue. The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 3, they vary similarly with decreasing impact as the trigger cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3. In the tables that follow, estimates are provided for each of options of Alternative 4.

Table 6-35 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4, Option 1b ($ Millions), 2004-2011.

2ii (sector allocation 1) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$6.10	$11.75	$0.45	$0.13	2004					2004				
2005	$24.76	$49.04	$1.91	$1.11	2005	$18.18	$36.01	$1.40	$0.82	2005	$14.97	$29.64	$1.15	$0.67
2006	$18.56	$33.48	$1.33	$0.77	2006	$16.85	$30.40	$1.21	$0.70	2006	$12.56	$22.65	$0.90	$0.52
2007	$0.81	$1.68	$0.06	$0.05	2007					2007				
2008					2008					2008				
2009	$2.13	$4.78	$0.09	$0.08	2009	$0.18	$0.40	$0.01	$0.01	2009				
2010					2010					2010				
2011	$19.37	$52.13	$0.99	$0.18	2011	$15.35	$41.32	$0.79	$0.14	2011	$4.46	$12.00	$0.23	$0.04
4ii (sector allocation 2) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$9.33	$17.99	$0.69	$0.20	2004					2004				
2005	$25.58	$50.67	$1.97	$1.15	2005	$20.52	$40.65	$1.58	$0.92	2005	$15.95	$31.59	$1.23	$0.72
2006	$18.85	$34.00	$1.35	$0.78	2006	$17.07	$30.80	$1.22	$0.71	2006	$15.27	$27.55	$1.09	$0.63
2007	$1.92	$3.95	$0.14	$0.11	2007					2007				
2008					2008					2008				
2009	$2.97	$6.65	$0.13	$0.11	2009	$0.33	$0.73	$0.01	$0.01	2009				
2010	$2.32	$6.61	$0.13	$0.02	2010					2010				
2011	$19.48	$52.43	$1.00	$0.18	2011	$15.74	$42.37	$0.81	$0.15	2011	$7.28	$19.60	$0.37	$0.07
6 (sector allocation 3) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$11.22	$21.62	$0.83	$0.25	2004	$1.89	$3.65	$0.14	$0.04	2004				
2005	$28.90	$57.23	$2.22	$1.30	2005	$22.69	$44.94	$1.75	$1.02	2005	$16.79	$33.25	$1.29	$0.75
2006	$19.28	$34.79	$1.38	$0.80	2006	$17.45	$31.48	$1.25	$0.72	2006	$16.37	$29.54	$1.17	$0.68
2007	$3.58	$7.37	$0.27	$0.21	2007					2007				
2008	$2.87	$5.10	$0.16	$0.06	2008					2008				
2009	$5.76	$12.90	$0.25	$0.20	2009	$1.00	$2.25	$0.04	$0.04	2009				
2010	$4.88	$13.88	$0.26	$0.05	2010					2010				
2011	$19.80	$53.28	$1.02	$0.18	2011	$17.23	$46.37	$0.88	$0.16	2011	$9.55	$25.71	$0.49	$0.09

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 6-36 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 1b, in percent of B season sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	7.6%	8.1%	0.6%	0.1%	2004					2004				
2005	26.1%	27.5%	2.0%	0.6%	2005	19.1%	20.2%	1.5%	0.5%	2005	15.8%	16.6%	1.2%	0.4%
2006	18.9%	19.8%	1.4%	0.5%	2006	17.1%	17.9%	1.2%	0.4%	2006	12.8%	13.4%	0.9%	0.3%
2007	1.0%	1.0%	0.1%	0.0%	2007					2007				
2008					2008					2008				
2009	2.7%	2.8%	0.1%	0.0%	2009	0.2%	0.2%	0.0%	0.0%	2009				
2010					2010					2010				
2011	19.6%	20.5%	1.0%	0.1%	2011	15.5%	16.3%	0.8%	0.1%	2011	4.5%	4.7%	0.2%	0.0%
4ii (sector allocation 2) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	11.7%	12.4%	0.9%	0.1%	2004					2004				
2005	26.9%	28.4%	2.1%	0.6%	2005	21.6%	22.8%	1.7%	0.5%	2005	16.8%	17.7%	1.3%	0.4%
2006	19.2%	20.1%	1.4%	0.5%	2006	17.4%	18.2%	1.2%	0.4%	2006	15.5%	16.3%	1.1%	0.4%
2007	2.3%	2.4%	0.2%	0.1%	2007					2007				
2008					2008					2008				
2009	3.8%	3.9%	0.2%	0.1%	2009	0.4%	0.4%	0.0%	0.0%	2009				
2010	3.5%	3.6%	0.2%	0.0%	2010					2010				
2011	19.7%	20.7%	1.0%	0.1%	2011	15.9%	16.7%	0.8%	0.1%	2011	7.4%	7.7%	0.4%	0.0%
6 (sector allocation 3) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	14.0%	14.9%	1.0%	0.2%	2004	2.4%	2.5%	0.2%	0.0%	2004				
2005	30.4%	32.0%	2.3%	0.7%	2005	23.9%	25.2%	1.8%	0.6%	2005	17.7%	18.6%	1.4%	0.4%
2006	19.6%	20.5%	1.4%	0.5%	2006	17.7%	18.6%	1.3%	0.4%	2006	16.6%	17.4%	1.2%	0.4%
2007	4.3%	4.5%	0.3%	0.1%	2007					2007				
2008	2.7%	2.9%	0.2%	0.0%	2008					2008				
2009	7.4%	7.6%	0.3%	0.1%	2009	1.3%	1.3%	0.1%	0.0%	2009				
2010	7.3%	7.6%	0.4%	0.0%	2010					2010				
2011	20.0%	21.0%	1.0%	0.1%	2011	17.4%	18.3%	0.9%	0.1%	2011	9.7%	10.1%	0.5%	0.0%

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 6-37 Hypothetical "at risk" ex-vessel nominal r gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 1b, in percent of total annual sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	3.8%	4.1%	0.2%	0.0%	2003					2004				
2005	13.3%	14.0%	0.5%	0.3%	2003	9.8%	10.3%	0.8%	0.2%	2005	8.0%	8.5%	0.6%	0.2%
2006	9.8%	10.3%	0.4%	0.2%	2003	8.9%	9.3%	0.6%	0.2%	2006	6.6%	6.9%	0.5%	0.2%
2007	0.5%	0.5%	0.0%	0.0%	2003					2007				
2008					2003					2008				
2009	1.5%	1.6%	0.0%	0.0%	2003	0.1%	0.1%	0.0%	0.0%	2009				
2010					2003					2010				
2011	11.7%	11.7%	0.2%	0.0%	2003	9.3%	9.3%	0.5%	0.0%	2011	2.7%	2.7%	0.1%	0.0%
4ii (sector allocation 2) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	5.9%	6.3%	0.4%	0.1%	2004					2004				
2005	13.8%	14.5%	1.1%	0.3%	2005	11.0%	11.6%	0.8%	0.3%	2005	8.6%	9.0%	0.7%	0.2%
2006	9.9%	10.4%	0.7%	0.2%	2006	9.0%	9.4%	0.6%	0.2%	2006	8.1%	8.4%	0.6%	0.2%
2007	1.1%	1.2%	0.1%	0.0%	2007					2007				
2008					2008					2008				
2009	2.1%	2.2%	0.1%	0.0%	2009	0.2%	0.2%	0.0%	0.0%	2009				
2010	2.0%	2.1%	0.1%	0.0%	2010					2010				
2011	11.8%	11.7%	0.6%	0.0%	2011	9.5%	9.5%	0.5%	0.0%	2011	4.4%	4.4%	0.2%	0.0%
6 (sector allocation 3) Option 1b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	7.1%	7.5%	0.5%	0.1%	2004	1.2%	1.3%	0.1%	0.0%	2004				
2005	15.5%	16.4%	1.2%	0.4%	2005	12.2%	12.8%	0.9%	0.3%	2005	9.0%	9.5%	0.7%	0.2%
2006	10.2%	10.7%	0.7%	0.2%	2006	9.2%	9.6%	0.7%	0.2%	2006	8.6%	9.0%	0.6%	0.2%
2007	2.1%	2.2%	0.2%	0.1%	2007					2007				
2008	1.4%	1.5%	0.1%	0.0%	2008					2008				
2009	4.1%	4.2%	0.2%	0.1%	2009	0.7%	0.7%	0.0%	0.0%	2009				
2010	4.1%	4.3%	0.2%	0.0%	2010					2010				
2011	12.0%	11.9%	0.6%	0.0%	2011	10.4%	10.4%	0.5%	0.0%	2011	5.8%	5.8%	0.3%	0.0%

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.

The effect of Alternative 4, option 2a, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown in Table 6-38 through Table 6-40 . The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total potential forgone pollock gross revenue from the CV sector. In the worst cases, potentially forgone shoreside value added gross revenue is estimated to be $100 million, or approximately 39 percent of B season total gross revenue and approximately 22 percent of total annual gross revenue. The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 3, they vary similarly with decreasing impact as the trigger cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3. In the tables that follow, estimates are provided for each of options of Alternative 4.

Table 6-38 Hypothetical "at risk" ex-vessel nominal revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 4 Option 2a ($ Millions), 2004-2011.

2ii (sector allocation 1) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$22.23	$42.85	$1.65	$0.49	2004	$18.35	$35.37	$1.36	$0.40	2004	$5.72	$11.02	$0.42	$0.13
2005	$32.07	$63.52	$2.47	$1.44	2005	$29.06	$57.55	$2.24	$1.31	2005	$24.88	$49.28	$1.92	$1.12
2006	$33.64	$60.69	$2.41	$1.39	2006	$28.12	$50.73	$2.01	$1.16	2006	$18.01	$32.49	$1.29	$0.75
2007	$15.19	$31.25	$1.13	$0.87	2007					2007				
2008					2008					2008				
2009	$6.51	$14.57	$0.28	$0.23	2009					2009				
2010					2010					2010				
2011	$35.57	$95.73	$1.82	$0.33	2011	$20.46	$55.06	$1.05	$0.19	2011				
4ii (sector allocation 2) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$22.38	$43.15	$1.66	$0.49	2004	$21.96	$42.32	$1.63	$0.48	2004	$6.51	$12.56	$0.48	$0.14
2005	$33.58	$66.51	$2.58	$1.51	2005	$29.89	$59.20	$2.30	$1.34	2005	$26.53	$52.54	$2.04	$1.19
2006	$33.83	$61.03	$2.42	$1.40	2006	$31.42	$56.68	$2.25	$1.30	2006	$22.05	$39.79	$1.58	$0.91
2007	$15.48	$31.85	$1.15	$0.89	2007	$10.13	$20.85	$0.75	$0.58	2007				
2008					2008					2008				
2009	$6.67	$14.94	$0.29	$0.24	2009					2009				
2010					2010					2010				
2011	$36.18	$97.37	$1.86	$0.34	2011	$26.14	$70.34	$1.34	$0.24	2011				
6 (sector allocation 3) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$24.60	$47.42	$1.82	$0.54	2004	$22.23	$42.84	$1.65	$0.49	2004	$16.28	$31.38	$1.21	$0.36
2005	$36.33	$71.95	$2.80	$1.63	2005	$30.86	$61.12	$2.38	$1.39	2005	$27.76	$54.99	$2.14	$1.25
2006	$34.18	$61.66	$2.45	$1.42	2006	$32.99	$59.51	$2.36	$1.37	2006	$26.07	$47.03	$1.87	$1.08
2007	$15.86	$32.63	$1.18	$0.91	2007	$13.85	$28.51	$1.03	$0.80	2007				
2008	$4.00	$7.10	$0.22	$0.08	2008					2008				
2009	$7.07	$15.84	$0.31	$0.25	2009	$3.28	$7.35	$0.14	$0.12	2009				
2010					2010					2010				
2011	$37.16	$100.00	$1.91	$0.35	2011	$28.12	$75.68	$1.44	$0.26	2011	$14.63	$39.39	$0.75	$0.14

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 6-39 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 2a, in percent of B season sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	27.8%	29.5%	2.1%	0.3%	2004	22.9%	24.3%	1.7%	0.3%	2004	7.1%	7.6%	0.5%	0.1%
2005	33.8%	35.6%	2.6%	0.8%	2005	30.6%	32.2%	2.4%	0.7%	2005	26.2%	27.6%	2.0%	0.6%
2006	34.2%	35.8%	2.4%	0.8%	2006	28.6%	29.9%	2.0%	0.7%	2006	18.3%	19.2%	1.3%	0.4%
2007	18.1%	18.9%	1.3%	0.5%	2007					2007				
2008					2008					2008				
2009	8.3%	8.5%	0.4%	0.1%	2009					2009				
2010					2010					2010				
2011	36.0%	37.7%	1.8%	0.1%	2011	20.7%	21.7%	1.1%	0.1%	2011				
4ii (sector allocation 2) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	28.0%	29.7%	2.1%	0.3%	2004	27.4%	29.1%	2.0%	0.3%	2004	8.1%	8.6%	0.6%	0.1%
2005	35.4%	37.2%	2.7%	0.8%	2005	31.5%	33.2%	2.4%	0.8%	2005	27.9%	29.4%	2.2%	0.7%
2006	34.4%	36.0%	2.5%	0.8%	2006	31.9%	33.5%	2.3%	0.8%	2006	22.4%	23.5%	1.6%	0.5%
2007	18.4%	19.2%	1.4%	0.5%	2007	12.1%	12.6%	0.9%	0.4%	2007				
2008					2008					2008				
2009	8.5%	8.8%	0.4%	0.1%	2009					2009				
2010					2010					2010				
2011	36.6%	38.4%	1.9%	0.1%	2011	26.5%	27.7%	1.4%	0.1%	2011				
6 (sector allocation 3) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	30.7%	32.6%	2.3%	0.4%	2004	27.8%	29.5%	2.1%	0.3%	2004	20.3%	21.6%	1.5%	0.2%
2005	38.3%	40.3%	2.9%	0.9%	2005	32.5%	34.2%	2.5%	0.8%	2005	29.2%	30.8%	2.3%	0.7%
2006	34.7%	36.4%	2.5%	0.8%	2006	33.5%	35.1%	2.4%	0.8%	2006	26.5%	27.8%	1.9%	0.6%
2007	18.9%	19.7%	1.4%	0.6%	2007	16.5%	17.2%	1.2%	0.5%	2007				
2008	3.8%	4.0%	0.2%	0.0%	2008					2008				
2009	9.0%	9.3%	0.4%	0.1%	2009	4.2%	4.3%	0.2%	0.1%	2009				
2010					2010					2010				
2011	37.6%	39.4%	1.9%	0.1%	2011	28.5%	29.8%	1.5%	0.1%	2011	14.8%	15.5%	0.8%	0.1%

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 6-40 Hypothetical "at risk" nominal gross revenue at risk and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 2a in percent of total annual sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	14.0%	14.9%	0.6%	0.2%	2003	11.6%	12.3%	0.9%	0.1%	2004	3.6%	3.8%	0.3%	0.0%
2005	17.2%	18.2%	0.7%	0.4%	2003	15.6%	16.4%	1.2%	0.4%	2005	13.4%	14.1%	1.0%	0.3%
2006	17.7%	18.6%	0.7%	0.4%	2003	14.8%	15.5%	1.1%	0.4%	2006	9.5%	10.0%	0.7%	0.2%
2007	9.1%	9.5%	0.3%	0.3%	2003					2007				
2008					2003					2008				
2009	4.6%	4.8%	0.1%	0.1%	2003					2009				
2010					2003					2010				
2011	21.6%	21.4%	0.4%	0.1%	2003	12.4%	12.3%	0.6%	0.0%	2011				
4ii (sector allocation 2) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	14.1%	15.0%	1.0%	0.2%	2004	13.8%	14.7%	1.0%	0.2%	2004	4.1%	4.4%	0.3%	0.0%
2005	18.1%	19.0%	1.4%	0.4%	2005	16.1%	16.9%	1.2%	0.4%	2005	14.3%	15.0%	1.1%	0.3%
2006	17.8%	18.7%	1.3%	0.4%	2006	16.6%	17.4%	1.2%	0.4%	2006	11.6%	12.2%	0.8%	0.3%
2007	9.2%	9.6%	0.7%	0.3%	2007	6.0%	6.3%	0.4%	0.2%	2007				
2008					2008					2008				
2009	4.8%	4.9%	0.2%	0.1%	2009					2009				
2010					2010					2010				
2011	21.9%	21.8%	1.1%	0.1%	2011	15.8%	15.8%	0.8%	0.1%	2011				
6 (sector allocation 3) Option 2a.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	15.5%	16.5%	1.1%	0.2%	2004	14.0%	14.9%	1.0%	0.2%	2004	10.3%	10.9%	0.8%	0.1%
2005	19.5%	20.6%	1.5%	0.5%	2005	16.6%	17.5%	1.3%	0.4%	2005	14.9%	15.7%	1.1%	0.4%
2006	18.0%	18.9%	1.3%	0.4%	2006	17.4%	18.2%	1.2%	0.4%	2006	13.8%	14.4%	1.0%	0.3%
2007	9.4%	9.9%	0.7%	0.3%	2007	8.3%	8.6%	0.6%	0.2%	2007				
2008	2.0%	2.1%	0.1%	0.0%	2008					2008				
2009	5.0%	5.2%	0.2%	0.1%	2009	2.3%	2.4%	0.1%	0.0%	2009				
2010					2010					2010				
2011	22.5%	22.4%	1.2%	0.1%	2011	17.1%	16.9%	0.9%	0.1%	2011	8.9%	8.8%	0.5%	0.0%

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.

The effect of Alternative 4, option 2b, hard cap allocation scenarios and cap levels on ex-vessel gross revenue and shoreside processing value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue are shown in Table 6-41 through Table 6-42. The estimates are provided for the port groupings of Akutan/Dutch Harbor and for all others combined. Recall that these values are a subset of the shoreside total potential forgone pollock gross revenue from the CV sector. In the worst cases, potentially forgone shoreside value added gross revenue is estimated to be $33 million, or approximately 13 percent of B season total gross revenue and approximately 8 percent of total annual gross revenue. The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area. As these numbers are a subset of the CV impact numbers presented previously under the impact analysis of Alternative 3, they vary similarly with decreasing impact as the trigger cap is increased, but greater effect on the CV, and thus shoreside, sector under allocation scenario 3. In the tables that follow, estimates are provided for each of options of Alternative 4.

Table 6-41 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4, Option 2b ($ Millions), 2004-2011.

2ii (sector allocation 1) Option 2b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$5.62	$10.83	$0.42	$0.12	2004					2004				
2005	$16.36	$32.41	$1.26	$0.74	2005	$10.09	$19.97	$0.78	$0.45	2005	$7.85	$15.56	$0.60	$0.35
2006	$13.31	$24.02	$0.95	$0.55	2006	$11.78	$21.25	$0.84	$0.49	2006	$7.94	$14.33	$0.57	$0.33
2007	$0.09	$0.18	$0.01	$0.01	2007					2007				
2008					2008					2008				
2009	$1.46	$3.27	$0.06	$0.05	2009	$0.18	$0.40	$0.01	$0.01	2009				
2010					2010					2010				
2011	$11.98	$32.23	$0.61	$0.11	2011	$8.80	$23.69	$0.45	$0.08	2011	$0.76	$2.04	$0.04	$0.01
4ii (sector allocation 2) Option 2b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$8.68	$16.74	$0.64	$0.19	2004					2004				
2005	$17.08	$33.84	$1.32	$0.77	2005	$12.15	$24.07	$0.94	$0.55	2005	$8.19	$16.21	$0.63	$0.37
2006	$13.60	$24.53	$0.97	$0.56	2006	$11.96	$21.58	$0.86	$0.50	2006	$10.48	$18.90	$0.75	$0.43
2007	$0.41	$0.84	$0.03	$0.02	2007					2007				
2008					2008					2008				
2009	$2.27	$5.08	$0.10	$0.08	2009	$0.28	$0.63	$0.01	$0.01	2009				
2010	$0.21	$0.60	$0.01	$0.00	2010					2010				
2011	$12.08	$32.50	$0.62	$0.11	2011	$9.02	$24.27	$0.46	$0.08	2011	$1.88	$5.05	$0.10	$0.02
6 (sector allocation 3) Option 2b.														
Cap:	**7,800**				**Cap:**	**23,400**				**Cap:**	**62,400**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	$9.49	$18.30	$0.70	$0.21	2004	$1.89	$3.65	$0.14	$0.04	2004				
2005	$20.09	$39.78	$1.55	$0.90	2005	$14.29	$28.30	$1.10	$0.64	2005	$8.95	$17.73	$0.69	$0.40
2006	$14.04	$25.32	$1.00	$0.58	2006	$12.34	$22.26	$0.88	$0.51	2006	$11.30	$20.38	$0.81	$0.47
2007	$1.17	$2.41	$0.09	$0.07	2007					2007				
2008	$1.38	$2.46	$0.08	$0.03	2008					2008				
2009	$3.98	$8.92	$0.17	$0.14	2009	$0.56	$1.25	$0.02	$0.02	2009				
2010	$0.39	$1.12	$0.02	$0.00	2010					2010				
2011	$12.39	$33.36	$0.64	$0.12	2011	$9.86	$26.55	$0.51	$0.09	2011	$3.99	$10.73	$0.20	$0.04

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 6-42 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 2b, in percent of B season sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	7.0%	7.5%	0.5%	0.1%	2004					2004				
2005	17.2%	18.1%	1.3%	0.4%	2005	10.6%	11.2%	0.8%	0.3%	2005	8.3%	8.7%	0.6%	0.2%
2006	13.5%	14.2%	1.0%	0.3%	2006	12.0%	12.5%	0.9%	0.3%	2006	8.1%	8.5%	0.6%	0.2%
2007	0.1%	0.1%	0.0%	0.0%	2007					2007				
2008					2008					2008				
2009	1.9%	1.9%	0.1%	0.0%	2009	0.2%	0.2%	0.0%	0.0%	2009				
2010					2010					2010				
2011	12.1%	12.7%	0.6%	0.0%	2011	8.9%	9.3%	0.5%	0.0%	2011	0.8%	0.8%	0.0%	0.0%
4ii (sector allocation 2) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	10.8%	11.5%	0.8%	0.1%	2004					2004				
2005	18.0%	18.9%	1.4%	0.4%	2005	12.8%	13.5%	1.0%	0.3%	2005	8.6%	9.1%	0.7%	0.2%
2006	13.8%	14.5%	1.0%	0.3%	2006	12.2%	12.7%	0.9%	0.3%	2006	10.6%	11.2%	0.8%	0.3%
2007	0.5%	0.5%	0.0%	0.0%	2007					2007				
2008					2008					2008				
2009	2.9%	3.0%	0.1%	0.0%	2009	0.4%	0.4%	0.0%	0.0%	2009				
2010	0.3%	0.3%	0.0%	0.0%	2010					2010				
2011	12.2%	12.8%	0.6%	0.0%	2011	9.1%	9.6%	0.5%	0.0%	2011	1.9%	2.0%	0.1%	0.0%
6 (sector allocation 3) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	11.9%	12.6%	0.9%	0.1%	2004	2.4%	2.5%	0.2%	0.0%	2004				
2005	21.2%	22.3%	1.6%	0.5%	2005	15.0%	15.8%	1.2%	0.4%	2005	9.4%	9.9%	0.7%	0.2%
2006	14.3%	14.9%	1.0%	0.3%	2006	12.5%	13.1%	0.9%	0.3%	2006	11.5%	12.0%	0.8%	0.3%
2007	1.4%	1.5%	0.1%	0.0%	2007					2007				
2008	1.3%	1.4%	0.1%	0.0%	2008					2008				
2009	5.1%	5.2%	0.2%	0.1%	2009	0.7%	0.7%	0.0%	0.0%	2009				
2010	0.6%	0.6%	0.0%	0.0%	2010					2010				
2011	12.5%	13.1%	0.6%	0.0%	2011	10.0%	10.5%	0.5%	0.0%	2011	4.0%	4.2%	0.2%	0.0%

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 6-43 Hypothetical "at risk" ex-vessel nominal gross revenue and shoreside nominal value added pollock first wholesale processing gross revenue by year, season, and aggregated port group under Alternative 4 Option 2b, in percent of total annual sector gross revenue, 2004-2011.

2ii (sector allocation 1) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	3.5%	3.8%	0.1%	0.0%	2003					2004				
2005	8.8%	9.3%	0.4%	0.2%	2003	5.4%	5.7%	0.4%	0.1%	2005	4.2%	4.4%	0.3%	0.1%
2006	7.0%	7.4%	0.3%	0.2%	2003	6.2%	6.5%	0.4%	0.1%	2006	4.2%	4.4%	0.3%	0.1%
2007	0.1%	0.1%	0.0%	0.0%	2003					2007				
2008					2003					2008				
2009	1.0%	1.1%	0.0%	0.0%	2003	0.1%	0.1%	0.0%	0.0%	2009				
2010					2003					2010				
2011	7.3%	7.2%	0.1%	0.0%	2003	5.3%	5.3%	0.3%	0.0%	2011	0.5%	0.5%	0.0%	0.0%
4ii (sector allocation 2) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	5.5%	5.8%	0.4%	0.1%	2004					2004				
2005	9.2%	9.7%	0.7%	0.2%	2005	6.5%	6.9%	0.5%	0.2%	2005	4.4%	4.6%	0.3%	0.1%
2006	7.2%	7.5%	0.5%	0.2%	2006	6.3%	6.6%	0.5%	0.2%	2006	5.5%	5.8%	0.4%	0.1%
2007	0.2%	0.3%	0.0%	0.0%	2007					2007				
2008					2008					2008				
2009	1.6%	1.7%	0.1%	0.0%	2009	0.2%	0.2%	0.0%	0.0%	2009				
2010	0.2%	0.2%	0.0%	0.0%	2010					2010				
2011	7.3%	7.3%	0.4%	0.0%	2011	5.5%	5.4%	0.3%	0.0%	2011	1.1%	1.1%	0.1%	0.0%
6 (sector allocation 3) Option 2b.														
Cap:	**25,000**				**Cap:**	**75,000**				**Cap:**	**200,000**			
	AKU/DUT		**All Others**			**AKU/DUT**		**All Others**			**AKU/DUT**		**All Others**	
Year	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**	**Year**	**CV-ExV**	**SVA**	**CV-ExV**	**SVA**
2004	6.0%	6.4%	0.4%	0.1%	2004	1.2%	1.3%	0.1%	0.0%	2004				
2005	10.8%	11.4%	0.8%	0.3%	2005	7.7%	8.1%	0.6%	0.2%	2005	4.8%	5.1%	0.4%	0.1%
2006	7.4%	7.8%	0.5%	0.2%	2006	6.5%	6.8%	0.5%	0.2%	2006	6.0%	6.2%	0.4%	0.1%
2007	0.7%	0.7%	0.1%	0.0%	2007					2007				
2008	0.7%	0.7%	0.0%	0.0%	2008					2008				
2009	2.8%	2.9%	0.1%	0.0%	2009	0.4%	0.4%	0.0%	0.0%	2009				
2010	0.3%	0.3%	0.0%	0.0%	2010					2010				
2011	7.5%	7.5%	0.4%	0.0%	2011	6.0%	5.9%	0.3%	0.0%	2011	2.4%	2.4%	0.1%	0.0%

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.

7.0 Summary of Potential Effects of Alternatives 2 and 4

This section provides a comprehensive summary, by alternative, option, cap, allocation scenario, and year of the analysis of potential impacts of the alternatives to the pollock fishery, chum salmon PSC, and Chinook salmon PSC. To do this, the all fleet aggregate total pollock potentially forgone gross revenue (Alt. 2 Option 1a) or gross revenue at risk[9] (Alt. 2 Option 1b, Alt. 4) along with their relative percentages of the annual total pollock fishery gross revenue, as well as the B season total fishery gross revenue, are displayed under the column headings of % Ann., % B, and $ mil. Please note that abbreviations were necessary in order to display all this information on a single page. Further, the aggregate total of Coastal Western Alaska chum AEQ and Upper Yukon chum AEQ is displayed under the column heading of chum. Finally, the aggregate of all BSAI Chinook salmon PSC impacts are shown under the column heading of "Chin," again due to space limitations.

This treatment combines potential impacts to pollock and salmon into a single table for each alternative and option; however, caution is warranted when reviewing these aggregated impact estimates for several reasons. One must be aware that the CV sector is most affected by the hard cap and triggered closure actions being considered and generally is estimated to potentially have a much higher percentage of gross revenue affected than the other sectors. Thus, this aggregated treatment results in lower potential impact percentages than occur in the CV sector. A complete treatment of potential effects to each sector is contained in the pollock impacts chapter and the reader is cautioned to review that treatment for a complete understanding of the potential impacts at the sector level. In addition, the chum salmon impacts shown here aggregate the Coastal Western Alaska and Upper Yukon effects together and a review of the salmon impacts chapter will provide clarity on the effects to each of these genetic stock groupings. Finally, the Chinook impacts shown here are the same as shown in the salmon impacts chapter; however, they are juxtaposed with the chum impacts so that one can see how the proposed actions affect each of these salmon species.

This summary will identify examples of impacts at the lowest cap level and under allocation scenario 1 and then will discuss how much the impacts are estimated to change as the cap level is increased. As has been pointed out previously, in the pollock and salmon impacts chapters, the effect of allocation scenario 2 and, further, allocation scenario 3 is to generally increase the effects in the CV sector, while slightly reducing effects in the other sectors. The overall effect of allocation scenarios 2 and 3 is to reduce total gross revenue impacts; however, caution must be taken to recognize that the CV sector will have greater impacts with the shift in allocation and will exclusively bear nearly all impacts under allocation scenario 3 and the highest cap levels. Interestingly, chum salmon savings decrease slightly under allocation scenario 2 but then increase in almost all years under allocation scenario 3. However, these changes in chum salmon savings are quite small and given that the overall impacts of estimated chum salmon savings are less than one percent of overall run size it is likely that the differences in chum savings as allocations scenarios are changed is of little consequence. Similarly, the differences in Chinook savings as allocation scenarios are changed are small; however, Chinook savings are consistently greatest under allocation scenario 1. Note that this statement also applies when there are reduced Chinook savings. In other words, the negative values are consistently the lowest, in absolute value, under allocation scenario 1 meaning the least negative impact on Chinook salmon under scenario 1.

The summarized potential impacts of Alternative 2, Option 1a, are shown in Table 7-1. The greatest adverse economic impacts, in terms of potentially forgone gross revenue, would have occurred in 2011 ($516 million) and in 2005 ($481 million) and under the most restrictive PSC cap of 50,000 non-Chinook

[9] Revenue is defined herein in all cases as gross revenue and any statement of the term "revenue" implies gross revenue.

salmon. As the hard cap level is increased to 353,000 fish the potentially forgone gross revenue estimates decline relative to the two lower caps and the impacts accrue mostly in the CV sector. For example, the 2005 gross revenue impact is estimated to decline from $481 million to $271 million and then to $202 million as the cap is increased. These impacts represent 78 percent of B season gross revenue, at the lowest cap level, and 33 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions. Also important to note is that the 2011 gross revenue values are calculated with a price that is approximately 55 percent higher than the 2005 value, while potentially forgone pollock tonnage estimates for 2011 are nearly 100,000 tons lower than the 2005 value. Thus, these gross revenue impacts, in nominal value, are subject to considerable price effects between the high value years of 2005 and 2011.

The potential benefits of Alternative 2, Option 1a, on AEQ chum salmon saved exceed 100,000 fish in 2005 under the 50,000 hard cap; however, the savings in other years are considerably lower and, of course, zero in years when the cap would not be hit and a closure would not be triggered. The 2005 estimates show that chum salmon savings are reduced to just over 65,000 and then to 31,000 fish as the cap is increased. Chinook salmon are also saved under this alternative as it is a complete closure of the pollock fishery from the time that the cap is reached for the remainder of the B season when Chinook PSC tends to be highest. Adult equivalent Chinook savings in the 2005 example year are estimated to be 36,543, 34,822, and 33,253, under the 50,000, 200,000, and 353,000 cap levels, respectively. These estimates show very little change in the Chinook salmon PSC in 2005; however, in other years Chinook PSC can fall by more than half between the lowest and highest cap estimates. This fact highlights the interannual variability in salmon PSC, as well as in the timing of pollock fishery closures.

The summarized potential impacts of Alternative 2, Option 1b, are shown in Table 7-2. Similar to option 1a, the greatest adverse economic impacts, in terms of gross revenue put at risk, would have occurred in 2011 ($311 million) and in 2005 ($201 million) and under the most restrictive PSC cap of 15,600 non-Chinook salmon. As the cap level is increased to 110,136 fish the gross revenue at risk estimates decline. For example, the 2005 gross revenue impact is estimated to decline from $201 million to $130 million and then to $67 million as the cap is increased. These impacts represent 33 percent of B season gross revenue, at the lowest cap level, and 11 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions.

The potential benefits of Alternative 2, Option 1b, on AEQ chum salmon saved are nearly 44,500 fish in 2005 under the 50,000 cap; however, the savings in other years are considerably lower and are negative in 2008. The negative value for chum saving means that chum PSC rates were higher after the June-July time period in that particular year. Thus, when pollock catch is delayed to August and beyond the higher PSC rates in that year result in higher estimated take of chum PSC. The 2005 estimates show that chum salmon savings are reduced to just over 40,000 and just fewer than 37,000 fish as the cap is increased. In contrast to Option 1a, Option 1b is a June-July closure with fishing resuming in August. Thus, Chinook salmon PSC is not reduced under this option because shifting fishing to later in the B season causes more Chinook PSC to be taken. Adult equivalent Chinook impacts in the 2005 example year are estimated to be an additional take of 20,609, 14,509, and 9,681, Chinook salmon under the three cap levels, respectively

Table 7-1 Comparison of potential impacts of Alternative 2, Option 1a, on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**50,000**					**200,000**					**353,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	33%	72%	$360	38,141	24,463	15%	34%	$167	19,862	18,577	8%	18%	$91	7,391	12,044
2005	38%	78%	$481	100,414	36,543	21%	44%	$271	65,282	34,822	16%	33%	$202	31,111	33,253
2006	33%	66%	$410	72,132	21,748	13%	27%	$164	37,624	19,225				14,835	
2007	15%	31%	$190	17,435	45,017				4,253						
2008				1,467											
2009															
2010															
2011	41%	73%	$516	12,644	16,701	13%	22%	$158	3,134	3,819	3%	5%	$33	1,059	2,846
4ii (sector allocation 2)															
Cap:			**50,000**					**200,000**					**353,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	30%	66%	$328	37,638	23,798	11%	24%	$118	21,063	17,320	4%	8%	$40	8,809	13,725
2005	29%	59%	$367	100,842	35,913	18%	37%	$232	71,027	33,584	12%	25%	$157	43,247	31,174
2006	26%	52%	$320	73,284	21,634	16%	33%	$203	45,789	19,537	11%	22%	$139	24,890	18,948
2007	13%	25%	$156	17,834	46,808				7,127					2,097	
2008				1,454											
2009	2%	4%	$21	668	890										
2010				366											
2011	36%	64%	$453	12,583	16,531	2%	4%	$30	946	2,351	1%	2%	$13	160	2,284
6 (sector allocation 3)															
Cap:			**50,000**					**200,000**					**353,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	26%	57%	$285	37,240	23,227	11%	23%	$114	22,547	18,804	4%	9%	$45	13,875	14,685
2005	28%	57%	$355	102,030	35,733	15%	30%	$187	78,111	31,541	14%	28%	$176	60,102	31,365
2006	20%	41%	$253	75,346	20,664	18%	36%	$223	55,338	19,961	13%	27%	$168	37,110	19,246
2007	12%	24%	$147	18,551	44,872				10,210					4,566	
2008				1,464											
2009	7%	13%	$73	1,613	1,112										
2010				885											
2011	38%	67%	$480	12,786	16,426	7%	12%	$88	1,819	14,233					

Table 7-2 Comparison of potential impacts of Alternative 2, Option 1b , on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:	**15,600**					**62,400**					**110,136**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	11%	23%	$115	-1,548	-2,974	9%	20%	$97	-1,573	-2,070	8%	17%	$84	-1,741	-1,790
2005	16%	33%	$201	44,459	-20,609	10%	21%	$130	40,279	-14,509	5%	11%	$67	36,717	-9,681
2006	12%	24%	$146	43,321	-9,165	6%	12%	$77	35,589	-7,442	5%	9%	$58	28,518	-6,042
2007	3%	6%	$35	10,059	-1,540				7,145					4,310	
2008				-62											
2009	5%	9%	$47	248	-361										
2010	1%	1%	$9	144	-1										
2011	25%	44%	$311	3,606	-17,140	11%	20%	$139	962	-6,336	3%	5%	$39	866	-1,761
4ii (sector allocation 2)															
Cap:	**15,600**					**62,400**					**110,136**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	11%	24%	$121	-3,082	-4,132	7%	15%	$77	-1,707	-1,657	2%	5%	$27	-502	-576
2005	16%	32%	$198	43,396	-21,167	7%	15%	$91	42,509	-14,641	4%	9%	$56	39,062	-11,475
2006	9%	19%	$118	43,501	-9,006	7%	13%	$83	38,101	-8,411	5%	10%	$63	32,224	-6,534
2007	0%	0%	$3	10,375	-122				7,830					5,842	
2008				25											
2009	5%	10%	$55	127	-620										
2010				70											
2011	23%	40%	$283	3,856	-17,047	9%	16%	$112	1,112	-8,625	2%	3%	$23	-76	-1,447
6 (sector allocation 3)															
Cap:	**15,600**					**62,400**					**110,136**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	12%	26%	$131	-5,674	-5,848	3%	6%	$32	-241	-684					
2005	16%	32%	$200	41,585	-21,977	7%	14%	$86	45,011	-15,070	5%	10%	$64	42,224	-13,216
2006	8%	17%	$103	43,254	-9,130	7%	14%	$86	40,574	-8,694	6%	13%	$78	36,232	-7,953
2007	1%	1%	$8	10,443	-2,139				8,675					7,172	
2008				46											
2009	6%	12%	$65	-22	-898										
2010				-12											
2011	21%	37%	$262	4,219	-17,107	11%	18%	$131	1,410	-11,454	4%	7%	$53	83	-4,543

The summarized potential impacts of Alternative 4, Option 1a, are shown in Table 7-3. As was the case with Alternative 2, the greatest adverse economic impact, in terms gross revenue at risk, would have occurred in 2011 ($240 million) and in 2005 ($139 million) and under the most restrictive PSC cap of 25,000 non-Chinook salmon. As the hard cap level is increased to 200,000 fish the gross revenue at risk estimates decline relative to the two lower caps and the impacts are concentrated in the CV sector. For example, the 2005 gross revenue impact is estimated to decline from $139 million to $123 million and then to $104 million as the cap is increased. These impacts represent 22 percent of B season gross

revenue, at the lowest cap level, and 17 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions.

The potential benefits of Alternative 4, Option 1a, on AEQ chum salmon saved are nearly 64,500 fish in 2005 under the 25,000 hard cap; however, the savings in other years are considerably lower and even negative in 2008. Negative AEQ chum salmon savings numbers for triggered closure area occur when the chum PSC rates outside the closure area are higher than inside of it in a particular year. The 2005 estimates show that chum salmon savings are reduced to just under 54,500 and then 32,500 fish as the cap is increased. Chinook salmon are also saved, in nearly all years, under this alternative as it is a complete closure of the pollock fishery from the closure area for the remainder of the B season when Chinook PSC tends to be highest. Adult equivalent Chinook savings in the 2005 example year are estimated to be 19,210, 18,981, and 18,475, under the 25,000, 75,000, and 200,000 cap levels, respectively. These estimates show very little change in Chinook PSC in 2005; however, in other years Chinook PSC can fall by more than half between the lowest and highest cap estimates. Also of note is that the greatest reduction of Chinook salmon PSC is estimated to be from the 2007 year; however, that was not a year with among the greatest AEQ chum savings. Again, these facts highlight the interannual variability in salmon PSC, as well as in the timing of pollock fishery closures.

The summarized potential impacts of Alternative 4, Option 1b, are shown in Table 7-4. Similar to option 1a, the greatest adverse economic impacts, in terms of gross revenue put at risk, would have occurred in 2011 ($88 million) and in 2005 ($85 million) and under the most restrictive PSC cap of 7,800 non-Chinook salmon. As the hard cap level is increased to 62,400 fish the gross revenue at risk estimates decline relative to the two lower caps and the impacts accrue mostly in the CV sector. For example, the 2005 gross revenue impact is estimated to decline from $85million to $64 million and then to $50 million as the cap is increased. These impacts represent 14 percent of B season gross revenue, at the lowest cap level, and 8 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions.

The potential benefits of Alternative 4, Option 1b, on AEQ chum salmon saved are nearly 44,000 fish in 2005 under the 7,800 cap; however, the savings in other years are considerably lower and are negative in 2004. The 2005 estimates show that chum salmon savings just under 41,000 fish at the highest cap. In contrast to Option 1a, Option 1b is a June-July closure with fishing resuming in August. Thus, just as in Option 1b of Alternative 2, Chinook salmon are not “saved” under this option because shifting fishing to later in the B season causes more Chinook PSC to be taken. Adult equivalent Chinook impacts in the 2005 example year are estimated to be an additional take of 15,519, 11,411, and 9,399, under the three cap levels, respectively.

Table 7-3 Comparison of potential impacts of Alternative 4, Option 1a , on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:			**25,000**					**75,000**					**200,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	13%	28%	$137	16,327	-2,267	10%	22%	$107	15,079	-1,000	4%	8%	$39	12,813	931
2005	11%	22%	$139	64,430	19,210	10%	20%	$123	54,498	18,981	8%	17%	$104	32,453	18,475
2006	10%	20%	$123	55,437	11,914	8%	16%	$100	44,827	11,397	5%	10%	$62	20,152	10,475
2007	6%	12%	$75	12,954	21,971	1%	2%	$15	10,623	2,123				3,395	
2008				-419					-9						
2009	2%	4%	$23	1,006	802										
2010				551											
2011	19%	34%	$240	5,946	14,847	14%	24%	$170	2,990	14,757	4%	6%	$44	1,617	2,585
4ii (sector allocation 2)															
Cap:			**25,000**					**75,000**					**200,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	12%	27%	$134	16,452	-2,008	10%	21%	$104	14,047	-2,459	3%	8%	$37	15,090	183
2005	11%	23%	$142	63,336	19,281	10%	20%	$121	58,255	18,942	9%	17%	$108	38,314	18,407
2006	10%	19%	$119	55,321	11,855	9%	17%	$108	48,234	11,362	6%	12%	$76	27,030	10,685
2007	6%	12%	$77	13,298	23,114	4%	8%	$52	11,145	105				5,756	
2008				-387					-111						
2009	2%	4%	$23	1,425	806										
2010				781											
2011	19%	34%	$240	6,656	14,833	14%	25%	$179	3,846	14,698	2%	3%	$19	400	2,112
6 (sector allocation 3)															
Cap:			**25,000**					**75,000**					**200,000**		
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	12%	27%	$134	16,352	-2,272	8%	18%	$92	14,828	-2,744	6%	13%	$64	12,542	-3,345
2005	12%	24%	$148	62,349	19,299	10%	20%	$124	60,780	18,973	9%	18%	$110	44,442	18,407
2006	10%	19%	$119	55,129	11,868	9%	18%	$114	51,178	11,529	7%	15%	$93	36,004	11,069
2007	7%	13%	$83	13,976	25,903	4%	8%	$51	11,504	10,454				8,503	
2008	1%	2%	$11	-174	1,795				-460						
2009	3%	5%	$26	1,756	821	1%	2%	$11	102	451					
2010				982					55						
2011	19%	34%	$242	6,865	14,831	14%	25%	$178	3,551	14,594	6%	11%	$76	283	13,268

Table 7-4 Comparison of potential impacts of Alternative 4, Option 1b, on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	5%	10%	$51	-3,319	-3,568	3%	5%	$27	-296	-812	2%	4%	$19	-308	-401
2005	7%	14%	$85	43,992	-15,519	5%	10%	$64	46,103	-11,441	4%	8%	$50	40,848	-9,399
2006	5%	9%	$58	43,634	-4,763	4%	9%	$53	42,186	-4,443	3%	6%	$37	34,907	-3,424
2007	0%	1%	$4	10,301	-759				9,218					6,809	
2008				76											
2009	1%	2%	$9	1,193	-74	0%	0%	$1	322	-9					
2010	0%	1%	$4	681	-2				176						
2011	7%	12%	$88	4,393	-7,441	6%	10%	$71	2,873	-6,010	2%	4%	$28	717	-2,098
4ii (sector allocation 2)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	5%	12%	$57	-5,273	-4,880	2%	5%	$25	-466	-761	1%	3%	$14	-379	-240
2005	7%	14%	$87	42,862	-16,020	5%	11%	$69	45,292	-12,850	4%	8%	$51	42,393	-9,977
2006	5%	9%	$59	43,628	-4,812	4%	8%	$50	42,252	-4,523	4%	7%	$45	37,043	-4,145
2007	1%	1%	$7	10,316	-1,689				9,483					7,504	
2008				63											
2009	1%	2%	$11	1,236	-107	0%	0%	$1	669	-15					
2010	1%	2%	$9	804	-145				367						
2011	7%	12%	$87	4,693	-7,466	6%	10%	$72	3,451	-6,114	3%	4%	$32	1,605	-2,773
6 (sector allocation 3)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	6%	12%	$62	-6,677	-5,677	3%	5%	$27	-1,303	-1,334	0%	0%	$0	128	-4
2005	8%	16%	$97	40,899	-18,123	6%	12%	$74	44,565	-14,224	4%	8%	$52	44,294	-10,507
2006	5%	10%	$60	43,040	-4,839	4%	8%	$51	42,674	-4,603	4%	8%	$48	39,483	-4,405
2007	1%	2%	$12	10,526	-3,093				9,796					8,353	
2008	1%	1%	$8	152	-114										
2009	2%	4%	$19	1,166	-241	0%	1%	$3	998	-32					
2010	2%	3%	$19	896	-325				547						
2011	7%	12%	$88	4,875	-7,571	6%	11%	$77	3,821	-6,586	3%	5%	$38	1,875	-3,424

The summarized potential impacts of Alternative 4, Option 2a, are shown in

Table 7-5. As was the case with Alternative 2, the greatest adverse economic impacts, in terms gross revenue at risk, would have occurred in 2011 ($183 million) and in 2005 ($108 million)under the most restrictive PSC cap of 25,000 non-Chinook salmon. Note that 2004 gross revenue at risk was actually slightly higher ($110 million) than in 2005; however, the 2004 values are considerably lower than the 2005 values as the caps are increased. Thus, 2005 is retained here as the example year As the hard cap level is increased to 200,000 fish the gross revenue at risk estimates decline relative to the two lower caps and the impacts accrue mostly in the CV sector. For example, the 2005 gross revenue impact is estimated to decline from $108 million to $94 million and then to $78 million as the cap is increased. These impacts represent 17 percent of B season gross revenue, at the lowest cap level, and 13 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions.

The potential benefits of Alternative 4, Option 2a, on AEQ chum salmon saved are more than 45,000 fish in 2005 under the 25,000 hard cap; however, the savings in other years are considerably lower and even negative in both 2004 and 2008. The 2005 estimates show that chum salmon savings are reduced to just under 38,500 and then 18,000 fish as the cap is increased. Chinook salmon are also saved, in all years except 2004 and 2005, under this alternative as it is a complete closure of the pollock fishery in the closure area from the time that the cap is reached for the remainder of the B season when Chinook PSC tends to be highest. Adult equivalent Chinook savings in the 2005 example year are estimated to be increasingly negative from 994, to 1,165, and then to -1,628 under the 25,000, 75,000, and 200,000 cap levels, respectively. The 2004 and 2005 negative values mean that Chinook PSC rates outside of the closure area were higher than within it in those years. Also of note is that the greatest savings of reduction in Chinook salmon PSC is estimated to be from the 2011 year; however, that was not a year with among the greatest AEQ chum savings. Thus, the interannual variability in salmon PSC rates, as well as in the timing and location of pollock fishery closures results in the variability of these estimates.

Finally, the summarized potential impacts of Alternative 4, Option 2b, are shown in

Table 7-5. The greatest adverse economic impacts, in terms of gross revenue put at risk, would have occurred in 2011 ($52 million) and in 2005 ($54 million) and under the most restrictive PSC cap of 7,800 non-Chinook salmon. As the hard cap level is increased to 62,400 fish the gross revenue at risk estimates decline relative to the two lower caps and the impacts accrue exclusively in the CV sector. For example, the 2005 gross revenue impact is estimated to decline from $54 million to $34 million and then to $25 million as the cap is increased. These impacts represent 9 percent of B season gross revenue, at the lowest cap level, and 4 percent at the highest cap level with annual proportion of gross revenue of about half of these B season proportions.

The potential benefits of Alternative 2, Option 1b, on AEQ chum salmon saved are nearly 35,500 fish in 2005 under the 7,800 cap; however, the savings in other years are considerably lower and are negative in 2004 and 2008. The 2005 estimates show that AEQ chum salmon savings are just under 33,500 fish at the highest cap. As is true in all the “b” options for June-July closure, Chinook salmon PSC is not reduced under this option because shifting fishing to later in the B season causes more Chinook PSC to be taken. Adult equivalent Chinook impacts in the 2005 example year are estimated to be an additional take of 10,350, 6,464, and 5,037 under the three cap levels, respectively.

Table 7-5 Comparison of potential impacts of Alternative 4, Option 2a , on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and hard caps, 2004-2011.

2ii (sector allocation 1)															
Cap:	**25,000**					**75,000**					**200,000**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	10%	22%	$110	-1,786	-4,685	8%	18%	$87	1,902	-4,626	2%	5%	$25	2,860	-817
2005	9%	17%	$108	45,096	-994	7%	15%	$94	38,356	-1,165	6%	13%	$78	17,901	-1,628
2006	8%	17%	$103	41,589	10,442	7%	13%	$83	33,834	10,092	4%	8%	$53	13,324	9,459
2007	5%	10%	$60	8,746	9,129	1%	2%	$11	7,264	1,032				2,398	
2008				-238					-41						
2009	2%	4%	$22	971	771										
2010				532											
2011	15%	26%	$183	1,770	14,923	10%	17%	$122	-809	14,871	2%	4%	$28	680	2,462
4ii (sector allocation 2)															
Cap:	**25,000**					**75,000**					**200,000**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	10%	22%	$107	-1,876	-4,337	8%	17%	$83	-555	-5,854	2%	5%	$26	5,270	-1,592
2005	9%	18%	$110	44,699	-969	7%	15%	$94	41,705	-1,179	7%	13%	$83	23,920	-1,641
2006	8%	16%	$100	41,715	10,397	7%	15%	$92	36,919	10,056	5%	10%	$64	18,927	9,604
2007	5%	10%	$61	8,972	10,688	3%	7%	$42	7,735	-11,973				4,043	
2008				-211					-62						
2009	2%	4%	$22	1,316	774										
2010				721											
2011	15%	26%	$183	2,156	14,913	10%	18%	$131	-243	14,790	1%	2%	$14	121	2,071
6 (sector allocation 3)															
Cap:	**25,000**					**75,000**					**200,000**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	10%	22%	$109	-2,043	-4,608	7%	15%	$74	-1,370	-5,523	5%	11%	$53	720	-6,253
2005	9%	19%	$117	43,411	-939	8%	16%	$97	42,521	-1,142	7%	14%	$86	30,395	-1,536
2006	8%	16%	$100	41,337	10,418	8%	16%	$96	38,556	10,170	6%	12%	$76	26,219	9,800
2007	5%	10%	$62	9,442	14,820	4%	7%	$44	8,077	-4,445				5,360	
2008	1%	2%	$11	-98	1,795				-186						
2009	2%	4%	$23	1,601	784	1%	2%	$11	103	415					
2010				896					56						
2011	15%	26%	$185	2,443	14,907	11%	19%	$133	-115	14,689	5%	9%	$67	-1,038	13,553

Table 7-6 Comparison of potential impacts of Alternative 4, Option 2b , on the pollock fishery, chum salmon, and Chinook salmon in the B season by sector and year under three different allocation schemes and caps, 2004-2011.

2ii (sector allocation 1)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	2%	5%	$26	-2,987	-2,780	1%	2%	$8	-121	-309	0%	1%	$5	-79	-146
2005	4%	9%	$54	35,325	-10,350	3%	6%	$34	37,363	-6,464	2%	4%	$25	33,362	-5,037
2006	3%	6%	$40	34,586	-3,400	3%	6%	$35	33,337	-3,109	2%	4%	$23	27,610	-2,186
2007	0%	0%	$0	7,858	-78				7,024					5,096	
2008				-2											
2009	1%	1%	$5	980	-44	0%	0%	$1	321	-9					
2010	0%	1%	$3	565	-2				176						
2011	4%	7%	$52	3,023	-4,589	3%	6%	$40	2,050	-3,464	1%	1%	$9	497	-597
4ii (sector allocation 2)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	3%	7%	$34	-4,969	-4,036	1%	2%	$8	-179	-303	0%	1%	$3	-143	-56
2005	4%	9%	$56	34,271	-10,789	3%	6%	$39	36,968	-7,708	2%	4%	$26	34,279	-5,245
2006	3%	7%	$40	34,677	-3,448	3%	6%	$35	33,509	-3,183	2%	5%	$31	29,262	-2,862
2007	0%	0%	$1	7,937	-351				7,238					5,715	
2008				5											
2009	1%	1%	$8	1,022	-76	0%	0%	$1	608	-13					
2010	0%	0%	$1	617	-12				334						
2011	4%	7%	$52	3,284	-4,622	3%	6%	$40	2,068	-3,510	1%	1%	$10	1,253	-785
6 (sector allocation 3)															
Cap:	**7,800**					**23,400**					**62,400**				
	% Ann.	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**	**% Ann.**	**% B**	**$ mil.**	**chum**	**Chin.**
2004	3%	7%	$36	-5,750	-4,388	1%	2%	$12	-1,059	-1,028					
2005	5%	11%	$65	32,763	-12,687	4%	7%	$46	36,219	-9,078	2%	4%	$28	35,879	-5,735
2006	3%	7%	$42	34,154	-3,474	3%	6%	$36	34,072	-3,254	3%	5%	$33	31,071	-3,058
2007	0%	1%	$4	8,149	-1,004				7,628					6,250	
2008	0%	1%	$4	101	-114										
2009	1%	2%	$13	990	-166	0%	0%	$2	791	-16					
2010	0%	0%	$2	597	-25				433						
2011	4%	8%	$53	3,394	-4,727	3%	6%	$43	2,561	-3,795	1%	2%	$16	1,558	-1,427

8.0 Environmental Justice

This chapter was originally prepared for the analysis of Chinook salmon management alternatives in the Bering Sea pollock fishery in support of Amendment 91. This treatment relies on US Census data from the 2000 census. At the time of preparation of this initial review analysis of 2010 Census data is ongoing. Furthermore, the Alaska Fisheries Science Center of NMFS is presently developing newly updated sector and community profiles of fishing communities in Alaska. This effort has been underway for some time now but is not yet complete. Once complete the updated sector can community profiles, along with additional 2010 Census data on employment, income, and poverty will be used to update this chapter prior to final action, which is presently scheduled for some time in 2013.

While some changes in the demography of minority and low income populations will likely be revealed in the updated Community Profiles and the new 2010 census data the information presented here is not expected to be fundamentally altered by the 2010 data. Thus, this section conveys needed information to evaluate, via initial review by the Council, the potential environmental justice issues associated with the proposed actions.

8.1 What is an environmental justice analysis

This chapter is an analysis required under Executive Order (E.O.) 12899, Environmental Justice (59 FR 7629) [10]. Under this E.O., demographic information is used to determine whether minority populations or low-income populations are present in the area affected by the proposed action. If so, a determination must be made as to whether the proposed action may cause disproportionately high and adverse human health or environmental impacts on those populations. The disproportionality of the adverse impact to identified minority or low-income populations is the key factor under environmental justice analysis. Adverse impacts that affect the wider population as a whole are not considered potential environmental justice impacts.

"Environmental" effects under E.O. 12898 are construed to include social and economic effects, and these are discussed in some detail in this section. Human health effects, as mentioned in E.O. 12898, appear to be less relevant to impacts potentially associated with the various management alternatives being considered in this document.[11]

There is no standardized methodology for identification or analysis of environmental justice issues. In determining what constitutes a minority "population," CEQ guidance states, "the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis." While no available federal guidance addresses the identification of low-income populations, a similar approach has generally been adopted when preparing National Environmental Policy Act (NEPA) documents (King 2001). The U.S. Environmental Protection Agency (EPA) has stated that addressing environmental justice concerns is entirely consistent with NEPA and that disproportionately high and adverse human health or environmental effects on minority or low-income populations should be analyzed with the same tools

[10] This section is based on the discussion in the Alaska Groundfish Harvest Specifications Final EIS (NMFS, 2007). The analysis was originally prepared by Michael Downs and Marty Watson of the consulting firm EDAW.

[11] E.O. 12898 does include language regarding the need to identify differential patterns of subsistence consumption of fish and wildlife, but it goes on to link this data collection with potential human health risks associated with the consumption of pollutant-bearing fish and wildlife. While subsistence in Alaska is associated more strongly with minority (Alaska Native) populations and low-income populations (those in rural areas with fewer commercial economic opportunities) than other populations, there is no indication that any of the alternatives being considered would result in a degradation of resources in a manner such that their consumption would result in a health risk elevated above existing conditions.

currently used in the NEPA process. NOAA environmental review procedures[12] state that, unlike NEPA, the trigger for analysis under E.O. 12898 is not limited to actions that are major or significant, and hence federal agencies are mandated to identify and address, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

While a "population" can mean a geographically localized set of people (for example, residents of a village, town, or other spatially bounded community), a "population" could also refer to a widely distributed set of people with a uniting or common set of circumstances, livelihoods, or lifestyles that may be affected by the management alternatives. Populations could be very localized (e.g., "population pockets" of workers living in group quarters at a series of processing plants in communities directly participating in the relevant fisheries) or they could be spread over very wide areas in a distribution pattern more closely resembling the total set of communities in a given region (e.g., residents of communities hundreds of miles removed from direct fisheries activities but that may nevertheless be affected by changes in access to subsistence resources that are themselves affected by the management action). Defining populations for analysis of non-Chinook salmon PSC in the Bering Sea pollock trawl fishery is challenging as the fishery literally spans an area offshore of thousands of miles of coastline that encompasses dozens of communities in Alaska, including many communities with high Alaska Native (i.e., minority) population percentages, as well as encompassing large numbers of participants from the Pacific Northwest.

8.2 What is the action area?

The action area is waters of the Bering Sea, as described in detail in EA Section 1.3. Note that the action area does not include the waters of the Aleutian Islands. This circumscribes the scope of the analysis somewhat since it is not necessary to consider the allocation of pollock to the Aleut Enterprise Corporation.

The definition of the action area notes that impacts of the action may occur outside the action area in the freshwater habitat and migration routes of the salmon caught as PSC. Non-Chinook salmon caught as PSC in the Bering Sea pollock fishery may originate from Asia, Alaska, Canada, Russia, and the western United States, although the vast majority of these fish originate in Asia and Western Alaska. Impacts may extend beyond those river systems, as subsistence harvesters distribute non-Chinook salmon through traditional gift and exchange networks. Thus persons in major cities not on the impacted river system, such as Anchorage, may be affected. Moreover, impacts may occur on shore in communities that process and arrange for the further distribution of pollock deliveries from catcher vessels.

The Yukon River extends beyond Alaska's border with Canada into the Yukon Territory. There are subsistence (aboriginal or First Nations), commercial, personal use, and sport fisheries for non-Chinook salmon in the Canadian Yukon. The pollock fleet in the Bering Sea may be taking non-Chinook as PSC that would otherwise return to the Yukon Territory and spawn, or be taken in one of these fisheries. All of these Yukon fisheries may provide disproportionate benefits to low income or minority populations. For example, the First Nation fishery is only open to the Yukon's Natives to provide for subsistence, ceremonial, and other cultural purposes. Yukon River harvests from the subsistence, commercial, personal use, and sport fisheries combined, averaged 10,051 non-Chinook over the period 1997-2006. (U.S. and Canada Yukon River Joint Technical Committee 2008)

The main non-Chinook salmon stocks in Asia spawn in rivers on Russia's Kamchatka Peninsula. The two most important drainages are those of the Kamchatka and Bolshaya Rivers (Varnavskaya and

[12] NOAA *Environmental Review Procedures for Implementing the National Environmental Policy Act* (Issued 06/03/99).

Shpigalskaya). Commercial fishing is an important industry in Kamchatka, and salmon harvests are an important component of this. Salmon harvests are also an important part of regional subsistence harvests. In the early 2000s, 50% of the population was reported to live under the poverty level (Colt et al., 2002) Several of Russia's indigenous populations live in Kamchatka, including the Koryak, Itelman, Even, and Chukchi (Tysiachniouk and Reisman). Minority populations have a history of subsistence use of fishery resources, although social changes in the region may have reduced the salience of traditional cultural practices for some communities (Colt et al., 2002) NMFS does not have detailed information on the specific role of non-Chinook salmon in the lives of low income and minority populations, however, under the circumstances it is probable that it does play a role.

Environmental Justice analysis is carried out with respect to residents of the U.S. Therefore, the Canadian Russia and Asian fisheries will not be discussed further in this chapter. However, the importance of this fishery to Yukon minorities and low income persons is undoubtedly very similar to the importance of similar fisheries on the Yukon in Alaska and many of the issues discussed below will be applicable to Yukon residents. The non-Chinook stocks of Kamchatka may also provide benefits to Russian minority and low income populations as well.

8.2.1 Western and Interior Alaska Communities

Environmental justice issues are particularly important for Alaskan communities around the perimeter of the Bering Sea, island communities in the Bering Sea, interior Alaska communities situated on or dependent on the great river systems, such as the Kuskokwim and Yukon, and communities in the southern Chukchi Sea. The harvests are important for coastal regions with Aleut, Alutiiq, Yup'ik and Inupiat populations, but also for Athabaskan Indian populations in interior Alaska.

As described EA Chapter 5, genetic analysis suggests that significant proportions of the non-Chinook salmon harvested by the pollock fishery in the Bering Sea originate in the rivers and streams of western Alaska. Non-Chinook salmon harvests are important components of subsistence and commercial fishery harvests in western Alaska, and play an important role in the subsistence/market economies of these regions. Many public comments received during the scoping process for the Amendment 91 EIS discussed how salmon serves an important cultural and economic role in the communities of Alakanuk, Eek, Nanakiak, Nunapitchuk, Emmonak, Kwethluk, Bethel, St. Mary's, Ruby, Nulato, Koyukuk, Kotlik, Galena, Kaltag, Fairbanks, Kongiganak, Quinhagak, Nenana, Minto, Marshall, and Hooper Bay, and throughout western and Interior Alaska (NMFS 2008)[13].

The pollock fishery also plays an important role in this region. Sixty-five western Alaska communities have an interest in the productivity of the pollock resource and the costs of harvesting pollock through their participation in the Community Development Quota program. Other communities, such as Dutch Harbor/Unalaska, play an important role in the fishery through the processing of pollock landed by pollock catcher-vessels.

8.2.2 South Central, Southeast Alaska, Pacific Northwest

Southcentral and Southeast Alaska have minority Alaska Native populations that use non-Chinook salmon for subsistence purposes. However, the impact of these actions on their non-Chinook use is likely to be much less of an issue in the Southcentral and southeast Alaska region communities than in western Alaska because relatively few fish in the PSC appear to come from these areas, and non-Chinook are less important as a subsistence resource in these areas:

[13] Section 10.3 provides detailed descriptions of regional subsistence, commercial, and recreational salmon fisheries throughout western Alaska.

- As indicated in Chapter 5, the limited genetic evidence does not indicate that large proportions of the non-Chinook PSC originate in these regions.
- Subsistence overall appears to be less important in these regions than in western Alaska. Subsistence harvest summaries from the Alaska Department of Commerce, Community, and Economic Development (ADCCED) indicate that per capita consumption tends to be smaller in Southcentral and Southeast Alaska boroughs and census districts than in those in western Alaska.

As noted in EA Chapter 5, genetic evidence suggests that some non-Chinook salmon present in the Bering Sea and taken as PSC originate in Pacific Northwest river systems. These non-Chinook may have originated in one or more of over 200 stocks British Columbia to Washington. The evidence does not connect the non-Chinook to specific river systems. Native American tribes in northwest Washington and along the Columbia River have treaty rights to the harvest of returning non-Chinook salmon stocks and do so for commercial, ceremonial, and subsistence reasons. Thus there is a potential environmental justice issue raised with respect to these fisheries.

The greater Seattle area is the center for much of the economic activity related to the North Pacific pollock fishery. However, the geographic footprint of those activities is difficult to define, and it cannot be attributed to specific communities or neighborhoods in the same manner as Alaska communities may be linked to the fishery, as discussed in the Groundfish Programmatic Supplemental Environmental Impact Statement (PSEIS, NMFS 2004a). Given the nature of engagement with the fishery, the Washington Inland Waters region does not have the same type of resident workforce focused in individual communities in a manner comparable to that seen in Alaska communities. Also, unlike the Alaska groundfish communities, the white portion of the population comprises a large majority of the overall population (i.e., racial or ethnic groups classified as minorities are mathematical minorities within the local overall population, unlike the relevant Alaska communities).

Data collected for the PSEIS (NMFS 2004a) suggest that large proportions of the workers at groundfish processing plants in Unalaska/Dutch Harbor, Sand Point, King Cove, and Akutan and workers on catcher-processor ships and motherships, are members of minority groups. These data are collected from group quarters in these communities suggesting that these workers are transients in these communities. The data do not provide information on place of residence. However, these minorities may raise environmental justice issues as well.

Pacific Northwest Tribal fisheries

Indian tribes in the Pacific Northwest have treaty rights to a share of the non-Chinook salmon. Not all tribes avail themselves of their rights under these 19th Century treaties, but many do. Members of the tribes that harvest non-Chinook salmon for subsistence, commercial, and ceremonial purposes, may be impacted by the actions under consideration. Tribes invest in fisheries management by hiring fisheries experts, carrying out fisheries research, managing tribal fishermen, representing tribal interests with state and federal managers, and investing in hatcheries and habitat enhancement. Tribes have created two tribal fishery commissions, the Columbia River Inter-Tribal Fish Commission and the Northwest Indian Fisheries Commission, to provide a tool for coordinated planning and joint management efforts. Not all tribes with salmon management responsibilities are members of the commissions.

Pacific Northwest Tribal Non-Chinook Harvests

Tribal harvests offshore of the Pacific Northwest, in Puget Sound, in the Columbia River and its tributaries, and in other inland waters, from 1998 to 2007, ranged between about 120,000 non-Chinook in 1998, and 340,000 non-Chinook in 2004 (PFMC 2008). Tribal harvests are used for many of the same purposes as Native Alaskan harvests in Alaska: for subsistence, for cultural (ceremonial) purposes, and to earn cash incomes.

More details about tribal involvement in non-Chinook salmon harvests may be found in the "Affected Environment" sections of the Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California and in the Columbia River Basin (NMFS 2003b) and the Puget Sound non-Chinook Harvest Resource Management Plan Final Environmental Impact Statement (NMFS 2004b).

8.3 Are minority or low income populations present?

A significant part of the population in the impacted area is made up of Alaskan Natives. Table 8-1 shows the Alaska Native population within each of the U.S. census districts in the action area and compares these with the proportions of the U.S. and Alaskan populations that are made up of American Indian and Alaska Natives. Less than one percent of the U.S. population, and about 15 percent of Alaska's population is made up of Native American. The Native American population in the census districts in the action area ranges from 15 percent to as much as 95 percent.

Table 8-1 Minority and low income populations by western Alaska census district, 2010 Census

Area	Population	American Indian or Native Alaskan	Two or more races	Min native percentage of population	Max native percentage of population
United States	308,745,538	2,932,248	n.a.	~ 1	n.a.
Alaska	710,231	104,871	51,875	15	22
Lake and Peninsula	1,631	1,061	164	65	75
Bristol Bay	997	334	167	34	50
Dillingham	4,847	3,470	438	72	81
Bethel	17,013	14,109	713	83	87
Wade Hampton	7,459	7,085	151	95	97
Yukon-Koyukuk	5,588	3,992	314	71	77
Nome	9,492	7,199	587	76	82
Northwest Arctic	7,523	6,121	448	81	87
Aleutians west	5,561	857	311	15	21
Aleutians east	3,141	876	153	28	33

Source: U.S. Bureau of the Census. Minimum percentage assumes only persons characterized as "American Indian or Alaskan Native" are Alaska Natives. Maximum assumes that all of the persons of two or more races are at least half Alaska Native. "Two or more races" category has not been used for the United States as the number is unlikely to be comparable in interpretation to the Alaskan estimates.

There are a large number of indigenous peoples, with a diversity of life-styles and cultures, living within the action area. Cultural differences with implications for resource use may exist even between groups identified within one of the broad cultural-linguistic groupings commonly used.[14] The following brief list of minority ethnic groups within the region depends primarily on Langdon (Langdon 2002). From North to South:

- Seward Peninsula and the eastern shore of Norton Sound as far south as Unalakleet are occupied by the Inupiat Eskimo. Langdon distinguishes between the Norton Sound and Bering Straits Inupiat (Langdon 2002). The later includes the community of Wales at the end of the Seward

[14] Fienup-Riordan found that attitudes towards non-Native hunters could contrast "sharply" between Yup'ik on Nelson and Nunivak Islands. Nelson Islanders sought to treat a relatively new musk ox resource in a more traditional manner, while Nunivak Islanders were more willing to support guided hunting as a way of earning income as well as acquiring meat (Fienup-Riordan, 2002). The point is that there can be significant cultural divergences even among fairly closely related ethnic groupings.

Peninsula, and the King Island community. No one lives on King Island, but the people who used to, and their descendants, maintain themselves as a distinct community on the mainland. Langdon notes that the Bering Straits Inupiat traditionally tended to harvest larger sea mammals, while the Norton Sound Inupiat tended to harvest small sea mammals, land mammals, fish, and migratory waterfowl.

- The Athabaskan Indians are inland rather than maritime peoples. They inhabit the central core of Alaska. Athabaskan groups living along the Yukon and Kuskokwim River systems may be especially affected by this action. These include the:
    - Deghitan on the lower Yukon and Kuskokwim Rivers
    - Holikachuk on the lower middle Yukon and Innoko Rivers
    - Koyukon in the middle Yukon and Koyukuk Rivers
    - Tanana on the Lower Tanana River
    - Tanacross on the middle Tanana River
    - Gwich'in on the upper Yukon and Porcupine Rivers
    - Han on the upper Yukon River
    - Upper Tanana on the upper Tanana River
    - Upper Kuskokwim on the upper Kuskokwim River

- The Yup'ik Eskimo occupy the great bulge formed by the Yukon and Kuskokwim River deltas and Nelson and Nunivak Islands. Langdon distinguishes between the Yukon, Kuskokwim, Bristol Bay and Delta Yup'ik and the Cup'ik of Nunavak Island. Membership in the different groups implies access to different resources and consequently somewhat different cultural practices. For example, he notes that Yup'ik communities along the resource rich Yukon and Kuskokwim Rivers tended to be larger than the communities of the Delta Yup'ik, who were further removed from these resources.

- The Unangan/Aleut occupy the Aleutian Islands. Langdon distinguishes between Eastern, Central, and western Unangan.

- The Sugpiaq/Alutiiq are the Pacific Eskimos, occupying the Alaska Peninsula, Kodiak, the Gulf waters of the Seward Peninsula, and Prince William Sound. Langdon identifies the Koniag Alutiiq in the west, the Chugach Alutiiq in the east, and the Eyak in the area of the Copper River delta. Communities to the south side of the Alaska Peninsula are generally considered to be minimally impacted by this action. However part of the homeland of the Koniag Alutiiq lies on the north side of the peninsula to the west of Bristol Bay.

The key point is that there is a complex group of indigenous minority populations that occupy the impacted area. There are many cultural similarities, but cultural differences may affect the way these populations interact with non-Chinook salmon and other subsistence resources. Cultural differences may exist between broadly defined groups such as the Yup'ik and the Athabaskans, but also between smaller groups within these larger groupings.

Members of Indian tribes in the Pacific Northwest are members of a racially and culturally distinctive minority in that region. Tribes of particular interest are those whose members harvest non-Chinook salmon, or could harvest non-Chinook salmon in the ocean fisheries off of the west coast, in Puget Sound, and on the Columbia River, for commercial, ceremonial, or subsistence reasons, pursuant to treaties between their tribes and the United States Government.

Other minority populations work on pollock catcher-processors, catcher-vessels, and shoreside processing plants.[15] These minorities enter the region for harvesting and processing pollock, and perhaps other species, but do not live there. However, these minority populations may also be impacted by the actions under consideration.

The PSEIS (NMFS 2004a) took two approaches to estimate the size of the potential minority population in the shoreside processing sector. Shoreside processors were surveyed to determine the size of minority populations employed, and 1990 and 2000 Census data on group housing was examined to determine the size of minority populations that may be resident in processor housing. The group housing data provided the most detailed and disaggregated information. Information was available separately for Unalaska/Dutch Harbor, Akutan, King Cove, and Sand Point:

- Unalaska: In both years a significant proportion of the residents of group housing were minorities, and the minority proportion grew from 1990 to 2000. Although demographic categories changed somewhat between the 1990 and 2000 census, some relatively large changes are readily apparent. For example, in 1990, the "Asian or Pacific Islander" category accounted for 27 percent of group quarters population, but 42 percent by 2000.
- Akutan: The racial and ethnic categories used in the two censuses differ somewhat making comparisons a little difficult. However, Asian and Pacific Islanders dominate the mix in both years (49 percent in 1990, and 43 percent in 2000). The Alaska Native/Native American population grew from 1 percent to 7 percent. The white population dropped considerably between the two censuses, from 42 percent in 1990 to 24 percent in 2000).
- King Cove: Minorities dominated the group housing in King Cove as well. Again, Asian and Pacific Islanders were the most common minority, rising from 58 percent of the population in 1990 to 64 percent in 2000. A mixture of other minorities were also important. The white population fell from 25 percent in 1990 to 12 percent in 2000.
- Sand Point: Asians and Pacific Islanders grew in importance here as well, rising from 42 percent of the population in 1990 to 61 percent in 2000. In 2000, whites accounted for most of the remaining population.

Confidentiality prevented a detailed description of the data on shoreside workforces collected from industry in 2000. Returns were received from four of the six large shoreside plants, and one of the two floating processors. Out of a combined workforce for these units of 2,364 persons, 22.5 percent were classified as white or non-minority, and 77.5 percent as minority. Not all plants provided details about the specific minorities in their plants. Of those that did, 5 percent or less were Black or African-American and 5 percent or less were Alaska Native/Native American. Asian/Pacific Islanders were the largest minority group in two-thirds of the plants in any region reporting detailed data, and the group classified as Hispanic was the largest minority group in the remaining one-third.

The labor force on the catcher-processors and motherships was not covered by the 1990 and 2000 Censuses. The analysis in the EIS was based solely on the industry survey. Different firms provided different levels of detail in the breakout of the internal composition of the minority component of their workforce, but the detailed information provided encompassed 1,906 out of the 2,126 persons reported, or 90 percent of the total reported workforce. In some instances firms simply reported minority and non-minority proportions of the workforce, in others they provided more detailed information. The portion of the workforce within the detailed reporting set was 36.9 percent white or non-minority and 63.1 percent minority. Adding the more highly aggregated data does not significantly change the overall minority/non-minority ratio. Within the total set of responding entities, individual entity workforces ranged from a 36

[15] The following discussion of minority composition of the Pollock industry workforce is based on the discussion in Section 3.9 of the Supplemental Programmatic Groundfish EIS (NMFS, 2004).

percent minority workforce to an 85 percent minority workforce. Among entities reporting detailed data, Hispanic was the largest minority component in every entity's minority workforce segment, with one exception (in which case the largest minority segment was Asian/Pacific Islander, and Hispanic was second). Apart from the entity where Asian/Pacific Islander workers were the largest minority worker segment, Asian/Pacific Islanders were the second largest minority group represented for all but one of reporting entities (in which case the second largest group was Alaska Native/Native American).

Catcher vessel ownership and crews are assumed to reflect the overall demographic makeup of the male working age population in their home communities. Although systematic demographic data were not collected for the groundfish catcher vessel crews in the Washington inland waters region, interviews with local sector association personnel suggest that minority population representation within this sector does not exceed the proportion of minority representation in the general population; therefore, environmental justice is not an issue with respect to potential impacts to this sector.

Many of the people in the action area have traditionally obtained significant amounts of food and materials by harvesting local resources. Paid jobs have been relatively scarce and often seasonal, and livings were earned in both the subsistence as well as the wage economy. These communities have been characterized by relatively low levels of labor force participation, high levels of unemployment, low per capita incomes, and high measured poverty rates. In part this reflects the inability of work and income statistics to measure activity outside of the formal marketplace. Significant numbers of transactions also appear to take place through undocumented barter and customary trade.

Because we are not in a position to systematically measure the contribution of subsistence or personal use harvest activity, and this informal production and trading activity, to income and consumption, the low income evaluation in this analysis is based on information from the formal, “documented” economy only.

Table 8-2 provides some income indicators, including the percentage of adults that are in the labor force, the percentage of adults that are unemployed, the percentage of persons in poverty, and per capita income. Labor force, unemployment, and income variables are difficult to interpret in these areas with their mixed subsistence/cash economies. A person’s formal labor force participation may be relatively small compared to what it might be in more heavily monetized economy; nevertheless, the person may be working very hard to earn a livelihood.

Table 8-2 1999-2000 Employment, income, and poverty information for census districts and boroughs in the action area from the 2000 Census

Status	Total adults	In labor force	Out of labor force	Employed	Unemployed	Unemployment rate	% not working	% pop in poverty	Per capita income
Alaska	458,054	326,596	131,458	281,532	27,953	9%	29%	9%	22,700
Aleutians East Borough	2,337	1,854	483	1,086	768	41%	21%	22%	18,400
Aleutians West Census Area	4,637	3,788	849	3,252	473	12%	18%	12%	24,000
Bethel Census Area	10,269	6,446	3,823	5,481	936	15%	37%	21%	12,600
Bristol Bay Borough	908	649	259	581	68	10%	29%	9%	22,200
Dillingham Census Area	3,216	2,007	1,209	1,765	230	11%	38%	21%	16,000
Lake and Peninsula Borough	1,224	678	546	581	97	14%	45%	19%	15,400
Nome Census Area	6,176	3,745	2,431	3,107	608	16%	39%	17%	15,500
Northwest Arctic Borough	4,535	2,877	1,658	2,427	447	16%	37%	17%	15,300
Wade Hampton Census Area	4,094	2,399	1,695	1,825	574	24%	41%	26%	8,700
Yukon-Koyukuk Census Area	4,531	2,847	1,684	2,276	566	20%	37%	24%	13,700

Notes: Alaska Department of Labor and Workforce Development. Accessed at http://almis.labor.state.ak.us/?PAGEID=67&SUBID=114 on April 1, 2008.

Pollock deliveries to shoreside processors[16]

Previous studies have indicated that the Alaska communities with the strongest engagement in the North Pacific groundfish fishery are Unalaska, Akutan, Sand Point, and King Cove.[17] These four communities and their specific ties to the groundfish fishery were detailed in the PSEIS (NMFS 2004a). The pollock TAC allocated to catcher vessels delivering to inshore AFA processors is divided among fishing cooperatives that have strong community orientations. Some 55 percent of the 2008 catcher vessel quota is allocated to three cooperatives associated with Dutch Harbor/Unalaska processors (the Unalaska Cooperative, the UniSea Fleet Cooperative, and the Westward Fleet Cooperative), and another 31 percent is allocated to a cooperative associated with an Akutan processor (the Akutan Catcher Vessel Association). This suggests that Dutch Harbor, followed by Akutan, will receive the largest proportions of the landed pollock. In this section, existing community level information is summarized.[18]

[16] This section is based on the discussion in the Alaska Groundfish Harvest Specifications Final Environmental Impact Statement (NMFS, 2007). The analysis was originally prepared by Michael Downs and Marty Watson of the consulting firm EDAW.

[17] As noted in Alaska Groundfish Fisheries PSEIS (NMFS 2004a) there are also ties between the fishery to Adak, Chignik, False Pass, and St. Paul. However, these ties are far less pervasive and do not have the historical depth of the ties seen in Unalaska, Akutan, Sand Point, and King Cove. Due to these differences in existing conditions, the communities of Adak, Chignik, False Pass, and St. Paul are not detailed in this section, but each may experience impacts resulting from management actions under the various alternatives, if not to the degree seen in Unalaska, Akutan, Sand Point, and King Cove.

[18] As noted above, this region also encompasses the Pribilof Island communities (St. George and St. Paul). While not having the same degree of direct engagement with the groundfish fisheries as the other communities specifically noted in this section, the Pribilof communities may experience impacts associated with groundfish management actions in a number of ways, as discussed in subsequent sections on impacts to CDQ communities and marine mammal-based subsistence. Existing conditions relevant to environmental justice analysis for these communities are discussed in more detail in those sections below.

These communities vary widely in their population structure. For example, Unalaska is the largest community but has the lowest Alaska Native population percentage, and King Cove and Sand Point have a much higher Alaska Native population component than either of the other two communities. While Akutan has a relatively low Alaska Native population percentage, the Alaska Native population is highly concentrated in one area.

As shown in Table 8-3 below, Unalaska has a far higher white or non-minority population percentage than the other three communities. Asian residents represent the largest population segment in Akutan, and the second largest in Unalaska (behind whites) and in King Cove (behind Alaska Natives), and the third largest in Sand Point (behind Alaska Natives and whites). These communities have quite different histories with respect to the growth of the different population segments present in the community in 2010.

Table 8-3 Racial and ethnic composition of population, selected Alaska Peninsula/Aleutian Islands Region communities, 2010

Race/Ethnicity	**Unalaska**		**Akutan**		**King Cove**		**Sand Point**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
White	1715	39	239	23	152	16	166	17
Black	300	7	184	18	9	1	24	3
American Indian/AK Native	268	6	56	6	360	38	381	39
Asian	1428	33	445	43	342	37	339	35
Pacific Islander	96	2	15	2	2	0	2	0
Other	324	7	40	4	30	3	13	1
Two or more races	245	6	48	5	43	5	51	5
Total	4376	100	1027	100	938	100	976	100
White	1715	39	239	23	152	16	166	17

Source: U.S. Bureau of Census.

Table 8-4 Employment, income, and poverty information, selected Alaska Peninsula/Aleutian Islands Region communities, 2010

Community	**Total Persons Employed**	**Unemployed**	**Percent Unemployment**	**Percent Adults Not Working**	**Not Seeking Employment**	**Percent Poverty**	**Median Family Income**
Akutan	1516	43	3	4	28	11.4	$33,750
King Cove	506	1	0	13	76	10	$70,417
Sand Point	1060	65	6	13	87	9	$62,321
Unalaska	3,938	87	2	5	111	11.5	$95,000

Source: U.S. Bureau of the Census.

One important constant across all of these communities is that each is a minority community in the sense that minorities make up a majority of the population in each community. Unalaska may be described as a plural or complex community in terms of the ethnic composition of its population. Although Unalaska was traditionally an Aleut community, the ethnic composition has changed with people moving into the community on both a short-term and long-term basis.

Akutan is a unique community in terms of its relationship to the Bering Sea groundfish fishery. It is the site of one of the largest shore plants in the region, but it is also the site of a village that is geographically and socially distinct from the shore plant. This duality of structure has had marked consequences for the

relationship of Akutan to the fishery[19] and in turn highlights the fundamentally different nature of Akutan and Unalaska. Akutan, while deriving economic benefits from the presence of a large shore plant near the community proper, has not articulated large-scale commercial fishing activity with the daily life of the community as has Unalaska, nor has it developed the type of support economy that is a central part of the socioeconomic structure of Unalaska.

While U.S. Census estimates show Akutan had a population of 589 in 1990 and 713 in 2000, the Traditional Council considers the local resident population of the community to be around 80 persons, with the balance being considered non-resident employees of the seafood plant. This definition obviously differs from census, state, and electoral definitions of residency but is reflective of the social reality of Akutan. The residents of the village of Akutan, proper, are almost all Aleut.

Sand Point and King Cove share a more or less common development history, but one quite different from either Unalaska or Akutan.[20] Historically, both of these communities saw a large influx of non-resident fish tenders, seafood processing workers, fishermen, and crew members each summer. For the last several decades, both communities were primarily involved in the commercial salmon fisheries of the area, but with the decline of the salmon fishery, plants in both communities have diversified into other species. In more recent years, the processing plants in both communities have become heavily involved in the groundfish fishery.[21]

Table 8-4 displays data on employment, income, and poverty[22] information for the relevant communities for 2010. The income range is large for the communities shown, with the median family income in Akutan being roughly a third of that in Unalaska.

The contrast between these and the other communities is reflective of both lack of economic development in these communities and the nature of the workforce population in communities with shore plants, where

[19] One example of this may be found in Akutan's status as a CDQ community. Initially (in 1992), Akutan was (along with Unalaska) deemed not eligible for participation in the CDQ program because the community was home to "previously developed harvesting or processing capability sufficient to support substantial groundfish participation in the BSAI …," though they met all other qualifying criteria. The Akutan Traditional Council initiated action to show that the community of Akutan, per se, was separate and distinct from the seafood processing plant some distance away from the residential community site, that interactions between the community and the plant were of a limited nature, and that the plant was not incorporated in the fabric of the community such that little opportunity existed for Akutan residents to participate meaningfully in the Bering Sea pollock fishery. That is, it was argued that the plant was essentially an industrial enclave or worksite separate and distinct from the traditional community of Akutan and that few, if any, Akutan residents worked at the plant). With the support of the APICDA and others, Akutan was successful in a subsequent attempt to become a CDQ community and obtained CDQ status in 1996.

[20] Sand Point was founded in 1898 by a San Francisco fishing company as a trading post and cod fishing station. Aleuts from surrounding villages and Scandinavian fishermen were the first residents of the community. King Cove was founded in 1911 when Pacific American Fisheries built a salmon cannery. Early settlers were mostly Scandinavian, European, and Aleut fishermen and their families.

[21] Their structural relationships to the fishery have diverged since the passage of the AFA. Processing facilities in both communities qualified as AFA entities; however, King Cove qualified for a locally based catcher vessel co-op while Sand Point did not.

[22] Poverty figures in this section are based on U.S. Census information which, in turn, is based on the Federal government's official poverty definition. Families and persons are classified as below poverty if their total family income or unrelated individual income was less than the poverty threshold specified for the applicable family size, age of householder, and number of related children under age 18 present. The poverty thresholds are the same for all parts of the country and are not adjusted for regional, state, or local variations in the cost of living. The poverty thresholds are updated every year to reflect changes in the Consumer Price Index.

large numbers of processing workers are present, tend not to have non-working adult family members present with them, and tend to be in the community exclusively for employment purposes.

Beyond the overall population, income, and employment estimates for the individual communities, it is important for the purposes of environmental justice analysis to examine information on the residential groundfish fishery workforces. It is likely that employment and income losses or gains associated with at least some of the proposed alternatives would be felt among the local seafood processing workers, and these workers do not comprise a representative cross section of the community demography.

One method to examine the relative demographic composition of the local processing workforces is to use group quarters housing data from the U.S. Census (keeping with the established practice of using U.S. Census data for environmental justice analysis). The group ethnicity-by-housing type data drawn from the 1990 census and the 2000 census (as well as subsequent sections augmenting this information with industry-provided estimates for 2000[23]) was discussed in detail in the PSEIS and is summarized here.

Group housing in Unalaska is largely associated with the processing workforce. A majority of the population lived in group housing as of 1990 and the total minority population proportion was substantially higher in group quarters than in non-group quarters. The 2000 estimates showed a similar overall split between populations in group quarters versus non-group quarters, but the minority population distribution between and within housing types changed substantially in the 1990 to 2000 period. Although demographic categories changed somewhat between the 1990 and 2000 census, some relatively large changes are readily apparent. For example, in 1990, the "Asian or Pacific Islander" category accounted for 27 percent of group quarters population, and 42 percent by 2000.

In general, in 2000 Unalaska had a substantially greater minority population in absolute and relative terms than it did in 1990, and this is readily apparent within the group quarters population that is largely associated with seafood processing workers. In other words, environmental justice is potentially a large concern if there is the potential for processing worker displacement, and one that has grown through time.

Group housing in Akutan is almost exclusively associated with the processing workforce. As of 2000, a total 89 percent of the population lived in group housing, which represents the extreme of the four communities considered in this region. In 2000, the racial and ethnic composition of the group and non-group housing segments were markedly different, with the non-group housing population being predominately Alaska Native (87 percent), and the group housing population having little Alaska Native/Native American representation (7 percent). Like Unalaska, overall minority population representation was higher in absolute and relative terms in the community as a whole and in both group and non-group quarters in 2000 than in 1990.

As with the other communities, group housing in King Cove is largely associated with the processing workforce (38 percent of the population in 2000). The distribution of ethnicity between housing types is striking. In 2000, Alaska Natives/Native Americans comprised 75 percent of the non-group quarters population in the community; there was only one Alaska Native/Native American individual living in group quarters in the community. The "Asian" group comprised over 64 percent of the group quarters population in 2000, having risen substantially from 1990.

The white component of the population of King Cove was smaller in absolute and relative terms in 2000 than in 1990 for the community as a whole and in group quarters. Among non-group quarters residents, the number of white residents was larger in 2000 than in 1990 but still represented a smaller proportion of

[23] Note that this information will be updated upon completion of the NMFS Community Profiles, scheduled for completion in 2013.

the non-group quarters population in 2000 than in 1990. In other words, environmental justice is clearly an issue of potential concern for the community as a whole and for the seafood processing-associated group quarters population in particular, and census counts suggest that minority representation has substantially increased over the period 1990 to 2000.

In Sand Point as of 2000, 36 percent of the population lived in group housing, which was only slightly less than the King Cove estimate for that same year. In 2000, no Alaska Natives/Native Americans lived in group quarters in the community, but they comprised 66 percent of the population living outside of group quarters. As shown, the ethnic and racial diversity among group quarters residents was, in general, substantially less in 2000 than in 1990. Asians comprised over 60 percent of all persons living in group quarters in 2000 with persons of Hispanic origin accounting for about two-thirds of the remaining 40 percent of group quarters residents.

Information on 2000 workforce demographics was obtained for four of the six major groundfish shore plants in the Alaska Peninsula/Aleutian Islands region, as well as one of the two floating processors that are classified as inshore plants. At least some of the entities voluntarily providing these data consider them confidential or proprietary business information, but they agreed to provide the information if it was aggregated with data supplied by others such that details about individual operations were not disclosed. As a result of these concerns, communities cannot be discussed individually.

It can be stated that the total combined reported processing (and administrative) workforce of 2,364 persons was classified as 22.5 percent white or non-minority, and 77.5 percent minority. Reporting shore plants ranged from having a three-quarters minority workforce to an over 90 percent minority workforce. It is worth noting that different firms provided different levels of detail in the breakout of the internal composition of the minority component of their workforce. For some plants, the total minority estimate was not disaggregated, and too few plants within this region provided detailed data to allow region-specific discussion.

In general, however, all of the shore plants in this region that provided detailed data have workforces that are 5 percent or less Black or African American and 5 percent or less Alaska Native/Native American (a pattern also seen in the detailed data from Kodiak plants). More variability was seen among other minority population components. The group classified as Asian/Pacific Islander was the largest minority group in two-thirds of the plants in any region reporting detailed data, and the group classified as Hispanic was the largest minority group in the remaining one-third. Two entities provided time series data. One provided data spanning a 10-year period, while the other provided information covering a 4-year span. For the former, the minority workforce component increased over time; for the latter, no unidirectional trend existed.

8.4 How do minority or low income communities interact with impacted resources?

The interaction of minority and low income communities with potentially impacted resources is treated in several previous sections. The locations of the sections this analysis depends on will be summarized here to avoid repetition. Potential effects of the proposed action on non-Chinook salmon are provided in EA Chapter 5, as well as in RIR Chapter 3. Chapter 3 provides considerable treatment on the management of non-Chinook salmon, the importance of subsistence use of Chinook and Chum salmon, potentially affected commercial as well as sport and personal use non-Chinook salmon fisheries. In addition, this chapter identifies regions and communities that depend on non-Chinook salmon and provided evidence of the importance of commercial salmon fisheries to the economies of Western Alaska.

Potential effects on the pollock fishery are assessed first by provision of descriptive information (Chapter 2) on the fishery, which includes a discussion of the CDQ program (section 2.7) as well as the Prohibited Species Donation program (section 2.6). Identification of communities that are dependent on the groundfish fishery, specifically pollock, is provided in section 3.9. These treatments will not be repeated here; however, the environmental justice assessment that appears below is highly dependent on all of these portions of the analysis and will draw directly from them.

In addition, there are discussion of interactions with marine mammals and seabirds, and other groundfish species, forage species, and other prohibited species provided here. This information is not provided in other parts of the EA or this RIR.

Marine mammals[24]

The subsistence take of marine mammals is restricted to the Alaska Native portion of the population under the terms of the Marine Mammal Protection Act of 1972 (as reauthorized in 1994 and amended through 1997; the specific exemption for Alaska Natives is found in Section 101 [16 USC 1371]). The Alaska Native exemption within the MMPA allows for Alaska Natives who dwell on the coast of the North Pacific Ocean or Arctic Ocean to take marine mammals for the purposes of subsistence (or for the purposes of creating and selling authentic native handicrafts and articles of clothing). EA Chapter 7 analyses the impacts of the alternatives on marine mammals.

Humans harvest a wide range of marine mammals in the action area, including seals, whales, Steller sea lions, and walrus. The mammals provide food and materials for a wide range of equipment and utensils. For example, walrus hides stretched over a wooden frame provided the materials for construction on the traditional umiak. The Marine Mammal Protection Act and the Endangered Species Acts permit the sale of handicrafts made from marine mammal parts. Thus handicrafts made from marine mammal parts may be sold to generate cash incomes (NMFS,n.d.).

As discussed in EA Chapter 8, pollock fishing activities and changes in those activities could impact marine mammal populations though competition for marine mammal prey, by disturbing the animals, or by accidentally killing or injuring animals ("takes") during the course of normal operations.

The focus in this discussion is on Steller sea lions, harbor seals, and northern fur seals. Harvests in comparison with the potential biological removals (the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population) for marine mammals have been used to identify marine mammals with potentially serious adverse impacts of the groundfish fishery for detailed analysis here. In situations where human induced mortality of species is close the animal's potential biological removal level, stock declines may lead to downward adjustments in removal levels, which would result in the removal level being exceeded under the current levels of mortality. Adjustments to mortality would then be considered, with reduction in subsistence harvests one possibility. Human induced mortality is close to the removal level for two species: Steller sea lions and harbor seals. Groundfish fishery competition for marine mammal prey may be an important factor that could lead to reductions in removal levels. Prey competition is considered for Steller sea lions and northern fur seals.

Steller sea lions are taken by a number of methods throughout the year. Unlike other subsistence activities that are more broadly participatory, hunting for sea lions is a relatively specialized activity, and a relatively small core of highly productive hunters from a limited number of households account for most

[24] This section reproduces, with minor changes, the marine mammals discussion from the Environmental Justice section of the Groundfish Harvest Specifications EIS. That section was originally prepared by Dr. Mike Downs and Marty Watson of the consulting firm EDAW (NMFS, 2007).

of the harvest. There has been some change in harvesting techniques in recent years, and there is also variation by region. Seasonality of sea lion harvest is quite variable and appears to be dependent on sea lion abundance and distribution.

Looking across regions, in 2003 approximately 51 percent of the total subsistence take of Steller sea lions occurred in the Aleutian Islands region, about 17 percent in the Kodiak Island region, about 15 percent in the Pribilof Island region, and about 12 percent in the North Pacific Rim region. The Southeast Alaska and South Alaska Peninsula regions accounted for about 3 and 2 percent, respectively, of the total subsistence take in 2003. In 2003 a total of 17 of the 62 surveyed communities reported harvesting sea lions, with 9 communities reporting takes of five or more sea lions. The seven top ranking communities were Atka (82 sea lions), Old Harbor (32 sea lions), St. Paul (18 sea lions), Unalaska (16 sea lions), St. George (14 sea lions), Tatitlek (14 sea lions), and Akutan (9 sea lions). These seven communities accounted for 185 sea lions, or 87 percent of the total Alaska subsistence take (Wolfe et al. 2004).

The number of individuals reporting hunting sea lions has declined substantially since the early 1990s. The estimated numbers of households that reported at least one member hunting sea lions declined from 199 in 1992 to 97 in 2003. In general, declines in the numbers of sea lion hunters occurred at a time when sea lions became increasingly harder to find in local hunting areas and consequently more difficult and expensive to hunt. Rate of success, however, has not tracked in parallel with numbers of hunters or reported increases in time and effort necessary to hunt successfully. The proportion of unsuccessful hunting households for sea lions has ranged from 40 percent in 1994 to 21 percent in 2001. (Wolfe et al. 2004).

While the available information suggests some support for a direct relationship between the overall Steller sea lion population and the level of subsistence harvest, such support is not definitive and other factors cannot be excluded. Given the relatively small numbers involved, the concentrated efforts of a single hunter or just a few hunters can make relatively large percentage changes in community harvest totals. The weighting of factors is also not possible from the evidence available. It does appear that present Steller sea lion harvest methods are likely to be more successful, and certainly more efficient, when resource populations (and density) are higher. A number of factors may be at work, however, such that a recovery in Steller sea lion abundance may not necessarily result in a marked increase in subsistence take, but too little is known regarding the determinants of subsistence demand for Steller sea lions to reach any definitive conclusions.

On a community level, it is important to note that of all the communities identified in the text of the PSEIS (NMFS 2004a) as having a documented Steller sea lion harvest, only Akutan and Unalaska are identified as “regionally important groundfish communities” with substantial direct participation in the fishery. In other words, where use of Steller sea lions is identified as important to the community subsistence base, the commercial groundfish fishery is generally not, and vice versa.

The PSEIS notes that fifty years ago, the harbor seal was so abundant in Alaska (and perceived to be in conflict with commercial salmon fisheries) that the state issued a bounty for the animal. State-sponsored bounties and predator control programs, as well as commercial harvest of harbor seals, occurred on a regular basis throughout the animal’s range until the passage of the MMPA. Both adult seals and pups were harvested for pelts. An estimated 3,000 seals, mostly pups, were harvested annually for their pelts along the Alaska Peninsula between 1963 and 1972, accounting for 50 percent of the pup production. (NMFS 2004a)

The PSEIS goes on to note that harvest of harbor seals for subsistence purposes is likely the highest cause of anthropogenic mortality for this species since the cessation of commercial harvests in the early 1970s. Between 1992 and 1998, the statewide harvest of harbor seals from all stocks ranged between 2,546 and

2,854 animals, the majority of which were taken in southeast Alaska. Aside from their value as a food source, harbor seals play an important role in the culture of many Native Alaskan communities. (NMFS 2004a)

The PSEIS provides the following regional information about the relationship between human induced mortality and the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population (the potential biological removals or PBR). The Bering Sea stock of harbor seals is approximately 13,000 animals, and the calculated PBR is 379 animals. The annual subsistence harvest from this stock from 1994 to 1996 was approximately 161 animals, 42 percent of PBR for this species. In 1998, 178 harbor seals from this stock were taken in the subsistence harvest. For the GOA stock, the calculated PBR is 868 animals. The average annual subsistence harvest from the GOA between 1992 and 1996 was 791 animals, representing 91 percent of the PBR for this stock. The latest available harvest data from 1998 (792) is comparable to the average subsistence harvest of harbor seals from previous years. For the southeast stock, the calculated PBR is 2,114 animals. The average annual subsistence harvest from southeast between 1992 and 1996 was 1,749 animals, representing 83 percent of the PBR for this stock (NMFS 2004a).

The context of subsistence harvest of northern fur seals is much different from that of Steller sea lions, and subsistence effort is highly concentrated in the communities of St. Paul and St. George in the Pribilof Islands. The commercial harvesting of northern fur seals on the Pribilof Islands began shortly after the first known discovery of the islands in 1786. The commercial harvest was continued by the United States when the Pribilof Islands came under U.S. jurisdiction with the purchase of Alaska from Russia in 1867 and lasted until 1984. The method of subsistence harvest of northern fur seals on the Pribilof Islands is a direct outgrowth of the commercial harvest that took place on the islands and, due to this historical and legislative context, the organization of the subsistence harvest of northern fur seals is very different from the organization of the harvest of Steller sea lions elsewhere. The subsistence harvest of northern fur seals in the Pribilof Islands is conducted as an organized, land-based, group activity.

NMFS entered into co-management agreements with the Tribal Governments of St. Paul and St. George under Section 119 of the MMPA in 2000 and 2001, respectively. These agreements are specific to the conservation and management of northern fur seals and Steller sea lions in the Pribilof Islands, with particular attention to the subsistence take and use of these animals. To minimize negative effects on the population, the fur seal subsistence harvest has been limited to a 47-day harvest season (June 23-August 8) during which only sub-adult male seals may be taken. In addition, the Fur Seal Act authorizes subsistence harvest of fur seals by Native Americans dwelling on North Pacific Ocean coasts (but not for seal skins, which must be disposed of), but that harvest can only be from canoes paddled by less than five people each and without the use of firearms.

On St. Paul Island, annual subsistence take of northern fur seals ranged between 754 and 522 animals over the period 2000-2003. On St. George, the annual harvest ranged between 203 and 121 animals over this same period. St. Paul and St. George are predominately Alaska Native communities. In 2000, the total population of St. Paul was 532, 86 percent of whom were Alaska Native/Native American. St. George had a population of 152 in 2000, of whom 92 percent were Alaska Native/Native American. These communities are relatively isolated, even by rural Alaska standards, from other population centers and private sector economic opportunities are relatively limited in both communities as well.

While northern fur seal harvest is an essential component of subsistence in the Pribilof Islands, only three non-Pribilof communities, the Aleutian communities of Akutan, Nikolski, and Unalaska, show any level of harvest for northern fur seals for any year in which ADF&G harvest surveys were conducted. For Akutan, during the single year that shows up in the data, fur seal harvests accounted for about 2 percent of the total subsistence harvest in the community. This is based on pounds per person of total subsistence

harvests for the community. For Nikolski and Unalaska, fur seal harvests accounted for about two-tenths of 1 percent and less than one-tenth of 1 percent of total community subsistence harvest, respectively.

As noted in the fur seal subsistence harvest EIS (NMFS 2005), the cumulative effect of the harvest of fur seal prey species (pollock) may result in a conditionally significant adverse impact on fur seals. Such an impact could potentially result in impacts on subsistence hunting opportunities, if the impacts result in a drop in fur seal population leading to a drop in subsistence harvest levels. However, the potential competition between fur seals and the pollock fishery is not well understood (EA Chapter 7).

Seabirds

Alaskans have been harvesting about 225,000 birds a year for subsistence purposes. Most of these are geese and ducks, but about 23,000 a year have been seabirds. Significant portions of the seabird harvest have taken place in the action area. St. Lawrence Island accounts for about 13,000 seabirds, while most of the rest are taken in the Yukon-Kuskokwim Deltas and the Bering Strait areas. Alaskans have also been harvesting about 113,000 bird eggs a year for subsistence purposes. The vast majority of these, about 95,000 a year, have been seabird eggs, and most of these have been taken in the action area. Particularly important components of the harvest come from the Northwest Arctic, the Bering Strait area, the Bristol Bay area, and St. Lawrence Island. Harvests are also taken, however, in the Yukon-Kuskokwim, Alaska Peninsula, and Aleutian Island areas (AMBCC).[25]

Pollock fishing activities and changes in those activities could impact seabird populations though competition for seabird prey, by accidentally killing or injuring birds ("takes") during the course of normal operations, or by impacting benthic habitat used by the birds. EA Chapter 7 analyzes the impacts of the alternatives on seabirds.

Groundfish

Groundfish species are those species that support either a single species or mixed species target fishery, are commercially important, and for which a sufficient data base exists that allows each to be managed on its own biological merits. Accordingly, a specific TAC is established annually for each target species. Catch of each species must be recorded and reported. This category includes pollock, Pacific cod, sablefish, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, flathead sole, Alaska plaice, "other flatfish," Pacific ocean perch, northern rockfish, shortraker rockfish, rougheye rockfish, "other rockfish," Atka mackerel, and squid (Council, BSAI FMP, page 10). EA Chapter 7 provides an analysis on the impacts of the alternatives on non-pollock groundfish.

Subsistence use of groundfish resources in Alaska is described in the PSEIS (NMFS 2004a). The PSEIS provides relatively little detail about groundfish subsistence in western Alaska, however. Data are provided for Unalaska and Akutan. This data (based on two surveys from the early 1990s) indicates that groundfish comprised 7 percent to 9 percent by weight of subsistence consumption; the major groundfish species consumed were cod and rockfish. Elsewhere in the state subsistence groundfish use levels also appear to be low compared to use levels of subsistence resources overall, and in relation to other fish resources in particular. Commercial fisheries may target stocks, such as rockfish that are also targeted by subsistence fishermen, but there is no indication that this dual use of stocks has resulted in detrimental impacts to groundfish subsistence utilization under existing conditions. (NMFS 2007) Thus the PSEIS indicates that pollock are not an important subsistence resource.

Forage fish

[25] Average annual harvests appear to be rough estimates prepared by the Alaska Migratory Bird Co-Management Council on the basis of a number of different survey instruments, and appear to apply to the period 1995-2002.

Forage fish species are those species which are a critical food source for many marine mammal, seabird and fish species. Forage fish may be important to low income and minority populations in the region, if, like eulachon and capelin, they are harvested for subsistence or commercial purposes. They are also important because other species depend on them for forage, and these other species, such as salmon, seals or sea birds, may be harvested for subsistence or commercial use.

Forage fish species in the Bering Sea and Aleutian Islands region include Osmeridae family (eulachon, capelin, and other smelts), Myctophidae family (lanternfishes), Bathylagidae family (deep-sea smelts), Ammodytidae family (Pacific sand lance), Trichodontidae family (Pacific sand fish), Pholidae family (gunnels) Stichaeidae family (pricklebacks, warbonnets, eelblennys, cockscombs, and shannys), Gonostomatidae family (bristlemouths, lightfishes, and anglemouths), and Order Euphausiacea (krill) (Council, BSAI FMP, page 11). EA Chapter 7 provides an analysis on the impacts of the alternatives on forage fish.

Most forage fish harvests in the Bering Sea and Aleutian Islands consist of smelts (although significant volumes of sandfish were taken in 2001). From 2002 to 2005, BSAI forage fish harvests ranged between 10 and 35 metric tons. Pollock trawling accounted for almost all of the smelt harvest; however, the available information indicates that the trawlers are harvesting a small proportion of biomass (NMFS 2007).

Prohibited species

Prohibited species are those species and species groups the catch of which must be avoided while fishing for groundfish, and which must be returned to sea with a minimum of injury except when their retention is authorized by other applicable law. Prohibited species in the Bering Sea include Pacific halibut, Pacific herring, Pacific salmon, Steelhead, King crab, and Tanner crab (Council, BSAI FMP, page 10-11).

Pacific salmon (Chinook and chum) have been dealt with in earlier sections. Several of the other species are the objects of fisheries carried out by commercial or subsistence fishermen from western Alaska (halibut, herring, steelhead) or of CDQ groups (crab species). Impacts on these species thus could have impacts on low income or minority communities in western Alaska.

EA Chapter 7 provides detailed background on the management of the PSC of these species by the pollock fishery and discusses the potential impacts of the alternatives on PSC.

8.5 How will the alternatives affect minority or low income communities?

The potential actions may affect minority and low income populations within the region in several ways. These include: (1) changes in non-Chinook salmon returns to escapement, subsistence harvest, or commercial harvest, in western and Interior Alaska and changes in salmon deliveries to food banks; (2) changes in pollock gross revenue earned through participation in the CDQ Program, and changes in western Alaska pollock landings by catcher vessels (3) changes in the impacts of other resources that are exploited commercially or for subsistence by residents of western Alaska, including salmon, marine mammals, seabirds, other groundfish, forage species, and prohibited species.

Based on the review of potentially impacted minority and low income populations, the following populations have been identified for detailed analysis:

- non-Chinook salmon users
- CDQ group beneficiaries
- Pollock fishing and processing workers
- Other marine resource users

This initial review draft analysis provides information on the potential for the alternatives to reduce non-Chinook salmon PSC, and thereby improve the likelihood that adult non-Chinook salmon will be made available to users of that resource. However, the analysis, at present, cannot provide direct estimates of improvements in non-Chinook salmon harvest by minority or low income portions of the populace. The analysis also identifies the potential effect that the alternatives may have on the CDQ sector via estimates of impacts specific to that sector. The CDQ entities; however, have not provided comprehensive royalty information to NMFS for several years. Thus, estimation of royalty impacts is problematic and has not been attempted. The analysis does contain descriptions of the pollock fishing sectors, processing workforce, and dependent communities and the impact that could potentially accrue are identified by Alternative and option. The accompanying EA, which is being developed concurrently to this RIR, will identify and describe other marine resource users and potential effects on other marine resources.

9.0 PREPARERS AND PERSONS CONSULTED for RIR

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11.0 Initial Regulatory Flexibility Analysis

11.1 Introduction

This initial regulatory flexibility analysis (IRFA) evaluates the potential adverse economic impacts on directly regulated small entities accruing from the proposed action to implement an amendment to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP). This action could establish a non-Chinook salmon prohibited species catch (PSC) limit for each Bering Sea (BS) pollock fishing season and sector, which, when reached, would require all directed pollock fishing to stop for that season. Alternatively, this action could establish area closures that could potentially be triggered when meeting a certain PSC cap level. This action is necessary to minimize non-Chinook salmon prohibited species catch (PSC) in the BS pollock fishery while achieving optimum yield, and is intended to promote the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), the FMP, and other applicable laws. One can find a further description of the proposed BS non-Chinook salmon management plan in the accompanying Environmental Assessment (EA) and Regulatory Impact Review (RIR) for this action. This IFRA addresses the statutory requirement of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

11.2 The purpose of an IRFA

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a federal regulation. Major goals of the RFA are (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the Small Business Administration (SBA) to file *amicus* briefs in court proceedings involving an agency's violation of the RFA.

In determining the scope, or ''universe'', of the entities to be considered in an IRFA, NMFS generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), NMFS would consider that segment the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis"

upon which to certify that the preferred alternative does not have the potential to result in "significant adverse impacts on a substantial number of small entities" (as those terms are defined under the RFA). Because, based on all available information, it is not possible to "certify" this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

11.3 What is required in an IRFA?

Under 5 U.S.C., section 603(b) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
- A description of the projected reporting, record keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that would accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives such as :
    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
    3. The use of performance rather than design standards;
    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

11.4 Definition of a small entity

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) small government jurisdictions.

Small business: Section 601(3) of the RFA defines a "small business" as having the same meaning as "small business concern", which is defined under section 3 of the Small Business Act. "Small business" or "small business concern" includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a "small business concern" as one "organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. Economy through payment of taxes or use of American products, materials or labor… A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $4.0 million for all its affiliated operations

worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $4.0 million criterion for fish harvesting operations. Finally, a wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when, (1) a person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) if two or more persons each owns, controls, or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors, or general partners, controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint ventures if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations. The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions. The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

11.5 A description of the reasons why action by the agency is being considered

Non-Chinook salmon, taken incidentally in the BS pollock fishery, is classified as "prohibited species catch" and must be avoided to the extent practicable.[26] Non-Chinook salmon is of significant economic and social importance, and as such, it is expressly regulated by NMFS in the BS pollock fishery. The purpose of non-Chinook salmon PSC management in the BS pollock fishery is to minimize non-Chinook salmon losses in trawl nets, to the extent practicable, while achieving optimum yield. Minimizing non-Chinook salmon PSC while achieving optimum yield, is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of non-Chinook salmon, provide maximum benefit to fishermen and communities that depend on non-Chinook salmon and pollock resources, and to comply with the MSA and other applicable federal law. As mentioned elsewhere in the EA and RIR, the Council recognized the need for a management approach to balance the competing requirements of the MSA's National Standard 1 and National Standard 9. Therefore, the Council determined that the institution of a comprehensive non-Chinook salmon PSC management plan is needed to improve the management of the pollock fishery in the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP).

Non-Chinook salmon PSC management has been a significant focus of past Council actions concerning the BS pollock fisheries. While reports from the current management system indicate that specific provisions designed to reduce non-Chinook salmon losses, such as the Rolling Hotspot System (RHS) coordinated through an inter-cooperative agreements (ICAs), have reduced non-Chinook salmon PSC rates under some conditions, when compared with what they would have been without the measures, However, concerns remain because of high numbers of non-Chinook salmon reported through 2007. Despite significant decreases in the number of non-Chinook salmon caught as PSC in 2008 and 2009, measures to prevent high levels of non-Chinook salmon PSC in the future may be needed.

11.6 Objectives of, and legal basis for, the proposed rule

Under the MSA, the management of marine fishery resources in the exclusive economic zone (EEZ) is vested in the Secretary of Commerce, and the Regional Fishery Management Councils. The BS pollock fishery in the EEZ is managed under the FMP. Statutory authority for measures designed to reduce PSC is specifically addressed in 50 CFR 600.350.

As described elsewhere in the EA and RIR for this action, the dual objectives of this proposed action are to implement conservation and management measures that minimize non-Chinook salmon PSC, to the extent practicable, in the BS pollock fisheries, in compliance with National Standard 9 of the MSA and, further, to comply with National Standard 1 of the MSA, which requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, optimum yield from each fishery.

11.7 Number and description of small entities regulated by the proposed action

The proposed action applies only to those entities that participate in the directed pollock trawl fishery in the BS. These entities include the American Fisheries Act (AFA) affiliated pollock fleet and the six western Alaska Community Development Quota Program (CDQ) groups that receive allocations of BS pollock.

[26] In general, PSC is required to be returned to the sea with a minimum of injury regardless of its condition. Salmon PSC must be counted by an observer prior to being returned to the sea, and in some cases, this requires the retention of salmon PSC. In addition, immediate discard of salmon and halibut PSC is not required for PSC donated to authorized recipients for delivery to food banks.

Table 11-1. Summary of Small and Large Entities for Regulatory Flexibility Act Purposes and Number of Vessels, Inshore Processors, and CDQ Groups

Entity class	Units	Directly regulated by action	Small	Non-small
Catcher/processors	Vessels	Yes	0	16
Motherships	Vessels	Yes	0	3
Catcher vessels	Vessels	Yes	0	90
Inshore processors	Plants (including fixed floating platforms)	Yes	0	7
CDQ groups	Non-profit organizations	Yes	6	0

The RFA requires a consideration of affiliations among entities for the purpose of assessing if an entity is small. The AFA pollock cooperatives in the BS are an important type of affiliation. All of the non-CDQ entities directly regulated by the proposed action were members of AFA cooperatives in 2008 and, therefore, NMFS considers them "affiliated" large (non-small) entities for RFA purposes.

Due to their status as non-profit corporations, the six CDQ groups are identified as "small" entities. This proposed action directly regulates the six CDQ groups, and NMFS considers the CDQ groups to be small entities for RFA purposes. As described in regulations implementing the RFA (13 CFR 121.103) the CDQ groups' affiliations with other large entities do not define them as large entities. Revenue derived from groundfish allocations and investments in BSAI fisheries enable these non-profit corporations to better comply with the burdens of this action, when compared to many of the large AFA affiliated entities. Nevertheless, the only small entities that are directly regulated by this action are the six CDQ groups.

Description of the CDQ groups

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. In aggregate, CDQ groups share a 10 percent allocation of the BSAI pollock total allowable catch (TAC).[27] These allocations, in turn, provide an opportunity for residents of these communities to participate in and benefit from the BSAI fisheries, through their association with one of the CDQ groups. The 65 communities, with approximately 27,000 total residents, benefit from participation in the CDQ Program, but are not directly regulated by this action. The six non-profit corporations (CDQ groups), formed to manage and administer the CDQ allocations, investments, and economic development projects are:

- Aleutian Pribilof Island Community Development Association (APICDA)
- Bristol Bay Economic Development Corporation (BBEDC)
- Central Bering Sea Fishermen's Association (CBSFA)
- Coastal Villages Region Fund (CVRF)
- Norton Sound Economic Development Corporation (NSEDC)

[27]*The CDQ Program also receives allocations of other groundfish TAC that range from 10.7% for Amendment 80 species, to 7.5% for most other species; however, these allocated amounts are not affected by this action.*

- Yukon Delta Fisheries Development Association (YDFDA)

The pollock fishery harvests on the order of 1 million metric tons of pollock each year (some years substantially more, some somewhat less) and provides millions of dollars in revenue to western Alaska CDQ communities through various channels, including the direct catch and sale or leasing of quota to various harvesting partners. The vessels harvesting CDQ pollock are the same vessels conducting AFA non-CDQ pollock harvesting. In addition to pollock allocations, CDQ groups have made significant investments in the at-sea pollock fleet as well as in hook & line and pot fisheries for such species as halibut, sablefish, crab, and Pacific cod. In addition, several of the CDQ groups have made, and continue to make, investments in fisheries and community infrastructure to support traditional local salmon fisheries in their regions.

11.8 Description of recordkeeping, reporting, and other compliance requirements

This section will be completed once the Council has selected a preferred alternative. Recordkeeping and reporting requirements potentially needed to implement the alternatives under consideration include those related to—

- reporting non-Chinook salmon PSC by vessels directed fishing for pollock in the BS;
- applications to receive transferable non-Chinook salmon PSC allocations;
- applications to transfer non-Chinook salmon PSC allocations to another eligible entity; and
- an annual report from the participants, documenting information and data relevant to the BS non-Chinook salmon PSC management program**.**

The CDQ groups enter contracts with partner vessels to harvest their pollock allocation. Many of these vessels are at least partially owned by the CDQ groups. The accounting of non-Chinook salmon PSC by partner vessels fishing under CDQ allocations would accrue against each respective CDQ group's seasonal PSC limit. Most of the recordkeeping, reporting, and compliance requirements necessary to implement the alternatives under consideration will apply to the vessels harvesting pollock, and to the processors processing pollock delivered by catcher vessels. For example, landings and production reports that include information about non-Chinook salmon PSC are required to be submitted by processors, under existing requirements at 50 CFR 679.5.

The CDQ groups already receive transferable Chinook and non-Chinook salmon PSC allocations and have received such allocations under the CDQ Program since 1999. Therefore, NMFS would not require CDQ groups to apply for recognition as entities eligible to receive transferable allocations of non-Chinook salmon. The CDQ groups are already authorized to transfer their salmon PSC allocations to and from other CDQ groups, using existing transfer applications submitted to NMFS. A few minor revisions to these transfer applications may be necessary; however, these revisions will not significantly increase the time or cost involved with submitting transfer applications. New under this proposed action, is the authorization for the CDQ groups to transfer non-Chinook salmon PSC allocations to and from AFA entities, outside of the CDQ Program, including the AFA inshore cooperatives and the entities representing the AFA catcher/processor sector and the AFA mothership sector.

The professional skills necessary to prepare the reporting and recordkeeping requirements that will apply to the CDQ groups under the preferred alternative include the ability to read, write, and understand English; the ability to use a computer and the internet to submit electronic transfer request applications,

and the authority to take actions on behalf of the CDQ group. Each of the six CDQ groups has executive and administrative staff capable of complying with the reporting and recordkeeping requirements of the preferred alternative and the financial resources to contract for any additional legal or technical expertise that they require to advise them.

11.9 Identification of all relevant federal rules that may duplicate, overlap, or conflict with the proposed action

No duplication, overlap, or conflict between this proposed action and existing federal rules has been identified.

11.10 Description of significant alternatives that minimize adverse impacts on small entities

The Council is considering an extensive and elaborate series of alternatives, options, and suboptions as it designed and evaluated ways to minimize non-Chinook salmon PSC in the BS pollock fishery. The EA presents the four alternative management actions, including combinations of various alternatives and options that emerged from this vetting process.

- **Alternative 1: Status Quo (No Action)**
- **Alternative 2: Hard cap (PSC Limit) closures**
- **Alternative 3: Triggered closures with intercooperative exemption for RHS**
- **Alternative 4: Triggered closures with intercooperative exemption for RHS and options for non-exempt closures.**

Please refer to section 2.5 of the EA for more detail, where the accompanying components are presented with the corresponding impacts analyses. Data on cost and operating structure within the CDQ sector are unavailable, so a wholly quantitative evaluation of the size and distribution of burdens cannot be provided. The following is a summary of the contents of those more extensive analyses, specifically focusing on the aspects which pertain to small entities.

Alternative 1

Alternative 1 would keep the existing Chum Salmon Savings Area (SSA) closures in effect. This area is closed to all trawling from August 1 through August 31. Additionally, if 42,00028 'other" salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15-October 14, the area remains closed. As catcher processors are prohibited from fishing in the CVOA during the "B" season, unless they are participating in a CDQ fishery, only catcher vessels and CDQ fisheries are affected by the PSC limit. This PSC limit is allocated among the non-CDQ pollock fisheries (89.3% or 37,506 salmon in 2011) and the CDQ Program (10.7% or 4,494 salmon). In the absence of an approved VRHS ICA described in Section 1.1.2 of the accompanying EA, NMFS closes the Chum SSAs to directed fishing for pollock from August 1-31 and additionally if either the non-CDQ or CDQ portions of the chum salmon PSC limit is triggered by vessels directed fishing for pollock in the Bering Sea. The Chum SSA was established in 1994 by emergency rule, and then formalized in the BSAI Groundfish FMP in 1995 under Amendment 35.

Under the status quo, the CDQ Program receives allocations of 10.7 % of the BS and AI Chum salmon PSC limits as prohibited species quota (PSQ) reserves. A portion of the PSC limit (10.7%, or 4,494 chum

[28] This number is inclusive of the allocation to CDQ groups. Non-CDQ 'other salmon' limit is 38,850.

salmon) is allocated to the CDQ Program as a PSQ reserve[29], while the remaining 37,506 chum salmon are available to the non-CDQ pollock fishery. NMFS further allocates the PSQ reserves among the six CDQ groups based on percentage allocations approved by NMFS on August 8, 2005. For chum salmon, the percentage allocations of the PSQ reserve among the CDQ groups are as follows:

- Aleutian Pribilof Island Community Development Association (APICDA) 14%
- Bristol Bay Economic Development Corporation (BBEDC) 21%
- Central Bering Sea Fishermen's Association (CBSFA) 5%
- Coastal Villages Region Fund (CVRF) 24%
- Norton Sound Economic Development Corporation (NSEDC) 22%
- Yukon Delta Fishery Development Corporation (YDFDC) 14%

Alternative 1 would likely impose the least burden on the CDQ groups, because it does not impose a non-Chinook salmon PSC limit that could prevent the full harvest of their respective pollock allocations. While the annual reports indicate that the RHS ICA has reduced non-Chinook salmon encounter rates compared to what they would have been without the ICA, the highest historical non-Chinook salmon PSC occurred in 2005 when the ICA was in effect under an exempted fishing permit. This high level of PSC illustrated that, while the management measures implemented under Amendment 84 provided the pollock fleet with tools to reduce salmon PSC, these measures contained no effective upper limit on the amount of salmon PSC that could occur in the BS pollock fishery. Therefore, the Council found that the conservation objective that was the basis for approving Amendment 84 had not been achieved, and the Council remains concerned that the status quo management has the potential for high amounts of non-Chinook salmon PSC as experienced in the mid-2000s.

Alternative 2

Alternative 2 would establish hard cap limits of non-Chinook salmon PSC in the pollock fishery. When the hard cap is reached all directed pollock fishing must cease and this alternative includes options for closure of the remainder of the B season or for June and July with fishing resuming in August. . Only those Chum salmon caught by vessels participating in the directed pollock fishery would accrue towards the cap, and fishery closures upon attainment of the cap would apply only to directed fishing for pollock. Several different options as to the scale of management for the hard cap are provided under this alternative: at the fishery level (separate hard caps for the CDQ Program and the remaining three AFA sectors combined); at the sector level (each of the four sectors including the CDQ sector receive a sector level cap with the CDQ sector level cap allocated to the individual CDQ groups); and at the cooperative level (the inshore CV sector level cap is further subdivided and managed at the individual cooperative level).

Under this alternative, Component 1 requires selecting the hard cap. If the hard cap is apportioned by sector (under Component 2), options are provided for the subdivision. Options for sector transfer or rollovers are included in Component 3. Further subdivision of an inshore sector cap to individual inshore cooperatives is discussed under Component 4 (cooperative provisions).

If none of the options under the Components 2-4 are selected, the Alternative 2 hard cap would apply at the fishery level and would be divided between the CDQ and non-CDQ fisheries. The CDQ sector would receive an allocation of 10.7% of a fishery level hard cap. The CDQ allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from exceeding its Chum salmon allocation. This prohibition would require the CDQ group

[29] See 50 CFR 679.21(e)(3)(i)(A)(3)(i) .

to stop directed fishing for pollock once its cap was reached because further directed fishing for pollock would likely result in exceeding the cap.

As described in the EA section 2.2, this alternative includes several different options for management of a PSC limit, including separate PSC limits for the CDQ Program and the remaining AFA sectors, and hard caps divided by season, by sector, or a combination of both. In addition, the Council included an option to allow small entities (i.e., CDQ groups) and non-CDQ groups to transfer non-Chinook PSC allocations among sectors, between the A and B seasons, or a combination of both, that would allow small entities more flexibility to harvest the full TAC in high non-Chinook salmon encounter years.

Regardless of the hard cap level or allocation option chosen, the establishment of an upper limit on the amount of non-Chinook salmon PSC in the BS pollock fishery would require participants in the CDQ Program to stop directed fishing for pollock, if a hard cap was reached, because further directed fishing for pollock would likely result in exceeding the non-Chinook salmon hard cap. As the analysis in the accompanying RIR demonstrates, the lower the hard cap selected, the higher the probability of a fishery closure, and the greater the potential for impacts to pollock revenues for the CDQ groups. However, the impacts to the CDQ groups appear to be relatively small in most years of the analysis.

Alternative 3

Alternative 3 would remove the existing Chum Salmon Savings Area (SSA) from regulation and replace it with a large area (80 percent non-Chinook PSC historic distribution) that would be closed to non-participants in a modified RHS program. The newly defined closure area serves as a powerful incentive for participation in the RHS. The RHS would be modified in several ways to improve the timely flow of information so that the hotspot closure system may function more effectively. Additional changes in management of the RHS at the vessel level and with greater constraints on some operators are included in the alternatives. In addition, the revisions to the RHS may include a B season Chinook threshold that, once met, would shift management focus from non-Chinook to the more environmentally sensitive Chinook stocks. The analysis contained in the RIR identifies benefits in non-Chinook salmon PSC reductions; however, the analysis of the Status Quo RHS has shown that the present system results in some decline in fishing efficiency and likely some increased cost of operations. Alternative 3 can be expected to potentially increase constraints on the pollock fishery thereby having the potential to increase the effects identified under the Status Quo. Thus, Alternative 3 is likely to have greater impact on the CDQ portion of the pollock fishery than Alternative 1 and less impact than the closures of Alternatives 2 and 4.

Alternative 4

The modified area triggered closure alternative (Alternative 3) is similar to the status quo in that regulatory time and area closures would be invoked when specified non-Chinook salmon PSC limits are reached. This alternative would incorporate new cap levels for triggered closures, sector allocations, and transfer provisions and could impose a lower potential burden on the CDQ groups than Alternative 2. If triggered, NMFS would only close the seasonal areas, described in section 2.3 of the EA, to directed pollock fishing. This alternative would not necessarily prevent small entities from the full harvest of their pollock TAC, because fishing effort outside of the closed areas could continue until the fishing season ended and/or after a June-July closure period.